MOBILE SURGICAL X-RAY SYSTEMS BV25-S

VOLUME 2 OF 2
VIDEO INFORMATION

VIDEO INFORMATION (VOLUME 2 OF 2)

LIST OF DOCUMENTS IN THIS BINDER:

NOTE:
O Indicates documents present in this binder.

OTHER BINDER: SYSTEM INFORMATION

SERVICE VIDEO INFORMATION
BV25 SYSTEM

MODULE CODE NUMBER : 4522 983 54971

LIST OF PAGES AND DRAWINGS

SERVICE MANUAL-UNIT

Digital Scopofix MDP

9807 721 0.001

This manual contains descriptive information
on the equipment identified by
the typenumber as stated above.

IPSC: Best

DIGITAL SCOPOFIX MDP

SERVICE MANUAL-UNIT DIGITAL SCOPOFIX MDP TYPE NR: 9807 721 0.001 SERIAL NR:

LIST OF PAGES AND DRAWINGS

PRINTING INSTRUCTIONS : 4522 983 14171

SECTION A: INTRODUCTION AND TECHNICAL DATA

CONTENTS

1. PURPOSE

The Medical Dual image Processor (MDP) is a digital video image memory for use in surgical X-ray systems (BV 25N). It has image processing capabilities for use in surgical X-ray systems and kidney Lithotriper.

2. VERSIONS

- 9807 721 00001	: basic MDP version compatible with: BV25-N family.
- 9807 721 01001	: basic MDP version, EMC-modified compatible with: BV25-N family.
- 9807 721 02001	: Basic MDP version, EMC-modified compatible with: BV25-N family and XTV8.

3. ITEMS SUPPLIED

- MDP built in a 19" rack
- front plate.
- installation material.

The rack consists of:

- Power supply	
- Back Panel pcb	(WHD10)
- AD converter/ADNR pcb	(WHD11)
- *Noise Reducer pcb*	*(WHD13)*
- 2 Memory pcb's	(WHD15,17)
- Subtractor pcb	(WHD19)
- Local Control pcb	(WHD20)
- Controller pcb	(WHD25)

The installation material consists of:

- 4x screw M4 to mount the front plate.
- 4x screw M6 to mount the MDP-rack in the BV-25 trolley.

4. EQUIPMENT IDENTIFICATION

The type numberplate is mounted on the front (left inside) of the rack.

5. TECHNICAL DATA

5.1. DIMENSIONS AND WEIGHT

Height : 300 mm
Width : 412 mm
Depth : 435 mm
Weight : 25 kg

5.2. PERFORMANCE DATA

5.2.1. Power supply

Supply voltage	*: 220 ±10% V 50/60 Hz*
Supply current	: < 2 A
turn on current	: < 25 A
Leakage current	: < 3.5 mA

5.2.2. Connectors

Video input (connector WHD:X3):

Source impedance	: 75 Ohm
Video amplitude	: 1100 mV ±5%
Sync amplitude	: 300 mV ±50 mV
Bandwidth	*: 8 Mhz*

Video output 1 and 2 (connector WHD:X4, WHD:X5):

Impedance	: 75 Ohm
Bandwidth	: 8 MHz
Video amplitude	: 1100 mV ±5%
Sync amplitude	: 300 mV ±50 mV

Synchronisation is normally locked to incoming video. When no input signal is available a standard interlaced SYNC-signal is internally generated, X-tal locked.

Remote control interface (connector WHD:X2)

All command lines are 5V LOCMOS-compatible and active-HIGH.

Input circuit:

- All inputs are low pass filtered
- Input impedance : 47 KOhm
- Input voltage HIGH : > 3.5 V
- Input voltage LOW : < 1.5 V

Output circuit:

- All outputs are buffered and protected with diodes.
- Output voltage HIGH : > 3.5 V (at -1 mA).
- Output voltage LOW : < 0.5 V (at +1 mA).

8 lines are reserved for automatic identification of the different memory units.

IDENT	FUNCTION	STATUS #
1	Single frame store + averaging	LOW
2	Dual frame store + averaging + integration	HIGH
3	Disc option	HIGH
4	Subtraction	HIGH
5	Zoom option (future feature)	LOW
6	Gamma correction	HIGH
7	Contour correction (future feature)	LOW
8	Spare	LOW

= Status for switched-on MDP-unit

5.2.3. TV Line Systems

- Interlaced or Non-interlaced possible.
- Jumper for selection 50Hz/60Hz.

50 Hz (CCIR)	60 Hz (EIA)
625 lines, interlaced 2 x 313 lines, non-interlaced	525 lines, interlaced 2 x 263 lines, non-interlaced

5.2.4. Image Matrix Size

The total unblanking period is stored.

AD conversion : 8 bits
Sampling rate : appr. 19 MHz
Memory depth : 10 bits

50 Hz : 576 lines of 975 pixels
60 Hz : 478 lines of 975 pixels

5.3. ENVIRONMENTAL DATA

The MDP-unit complies with classification C1 (UXW 13600).

Ambient temperature:

storage : -25°C to +70°C.
operation : +10°C to +40°C.

Relative humidity:

storage : 10% to 90%
operation : 10% to 85%

5.4. APPLICABLE STANDARDS

- UL 478
- CSA C22.2 nr. 154
- HHS certified
- IEC 435
- CISPR 11 and 11A
- FCC rules CFR 47 part 2 and 15
- VDE 871 level B

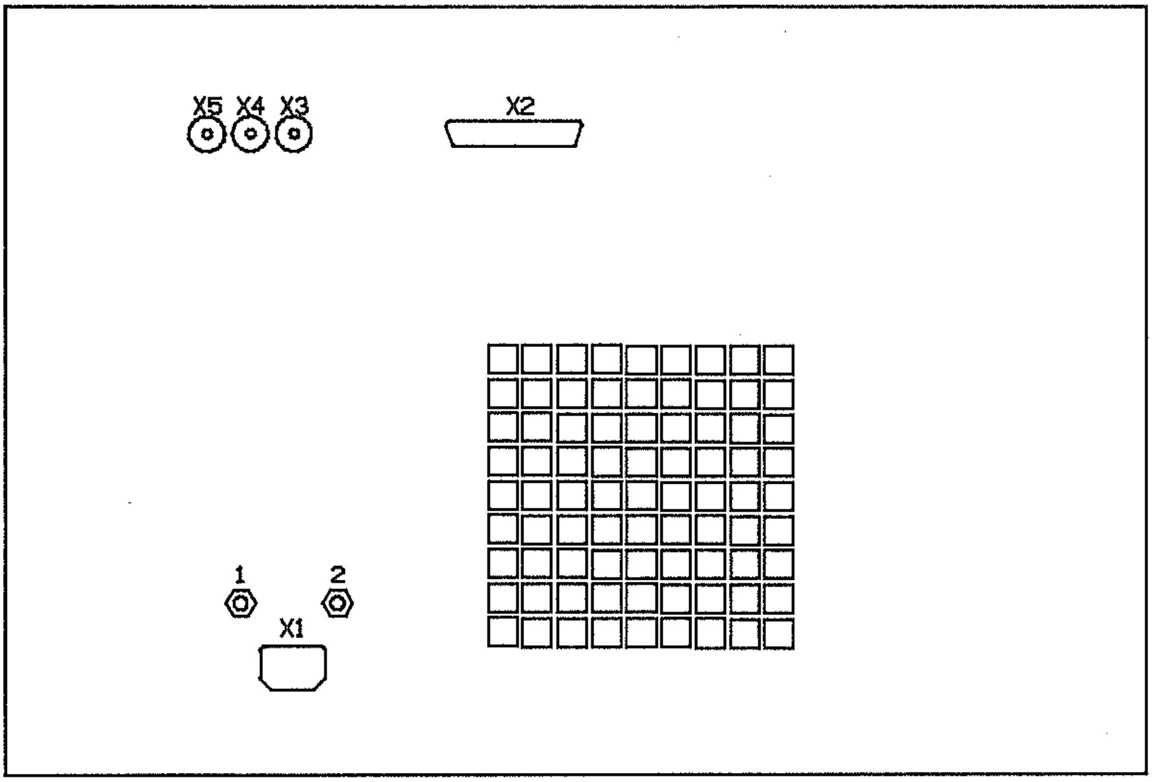


Figure 1: Rear view MDP-unit

Connector	Function
WHD:1	Safety ground
WHD:2	Signal current
WHD:X1	Mains supply
WHD:X2	Remote connector interface
WHD:X3	Video input
WHD:X4	Video output 1
WHD:X5	Video output 2

Figure 2 : Connector locations

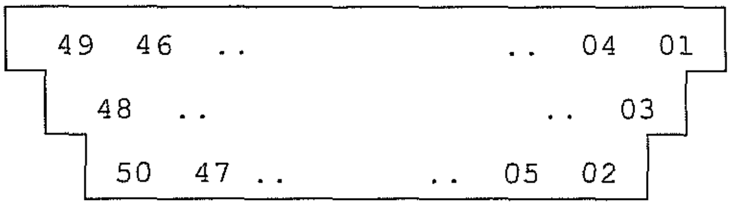


Figure 3: Rear view MDP-unit

INPUT		OUTPUT	
FUNCTION	PIN	FUNCTION	PIN
START	08	IDENT1	38
MEM1	10	IDENT2	40
MEM2	11	IDENT3	42
LIH	13	IDENT4	44
ER	14	IDENT5	46
NR1	19	IDENT6	48
NR2	20	IDENT7	50
NR3	21	IDENT8	49
NR4	22	BUSY	37
DISK OPTION	02,04,06	DISK OPTION	33
GAMMA1	24	+5V/500 Ohm	30,32
GAMMA2	25	SPARE1	31
SUB1	27	SPARE2	35
SUB2	28		
ZOOM	16		
INVERT	17		
TRACE	12		
RESERVED	41,45		
0V	01,03,05,07,09, 15,18,23,26	0V	29,34,36,39,43 ,47

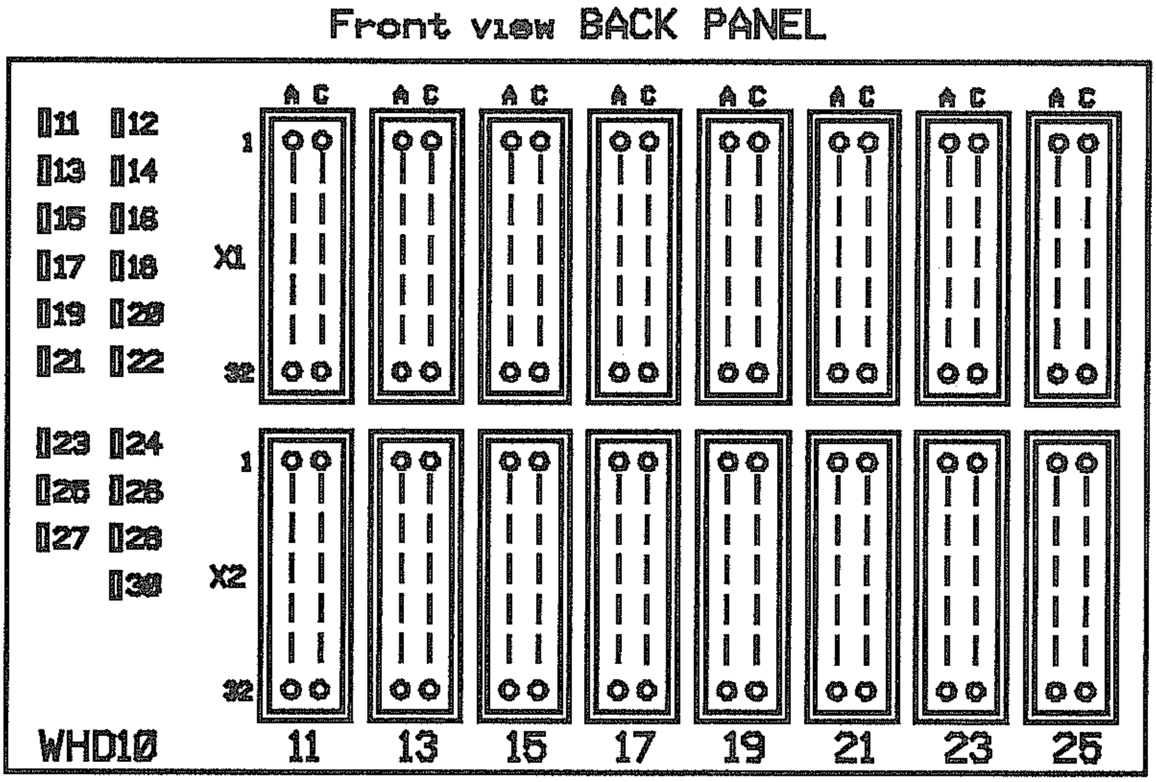


Figure 4: Front view Back panel

SECTION B: INSTALLATION

CONTENTS

1. INTRODUCTION

The instructions how to install the MDP-unit in a BV 25 system will be found in the System Service Manual of the BV 25 system.

2. TOOLS AND TEST EQUIPMENT

- Standard toolset.

3. PROGRAMMING FACILITIES

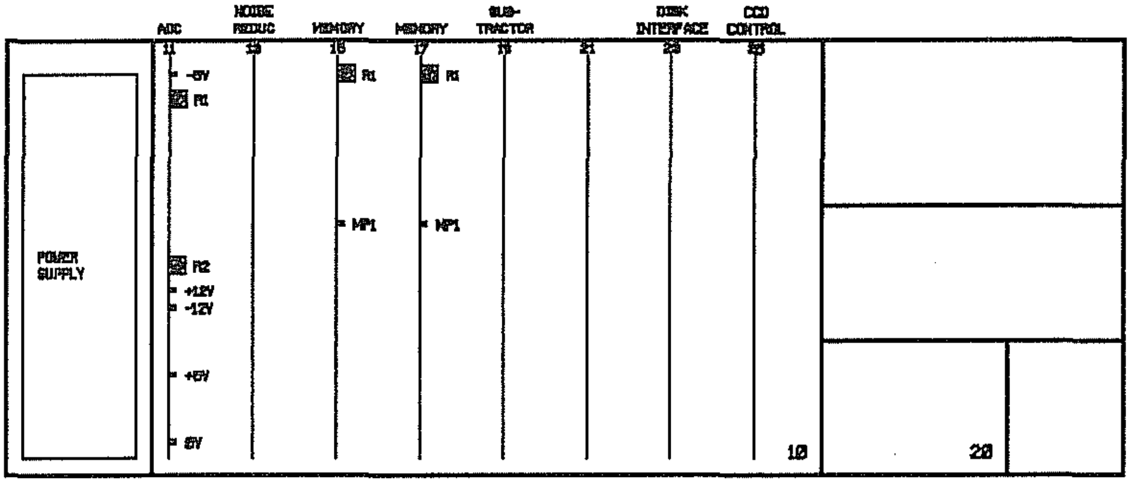


Figure 1: Switches and jumpers at the front of the rack

3.1. AD CONVERTER BOARD / AD-NOISE REDUCER BOARD (WHD11)

Depending on the MDP version, basic or basic modified for XTV-8, an AD converter board (up to 4522 107 87053) or an ADNR board (4522 108 1962.) is placed in the MDP. The ADNR board is downwards compatible with the AD-converter board. It contains the same functionality however the ADNR board is extended with a recursive digital filter.

Programming facilities:

AD converter board : Switch WHD11:S1 activates the internal video test-pattern.

ADNR board : - Switch WHD11:S1 activates the internal video test-pattern.
- Jumper WHD11:W1 enables/disables the noise reduction function.

3.2. SUBTRACTOR BOARD (WHD19)

Figure 2 gives a simplified diagram to explain the function of the switches WHD19:S1 -> S4.
Figure 3 shows selection possibilities of the switches WHD19:S1 -> S4.

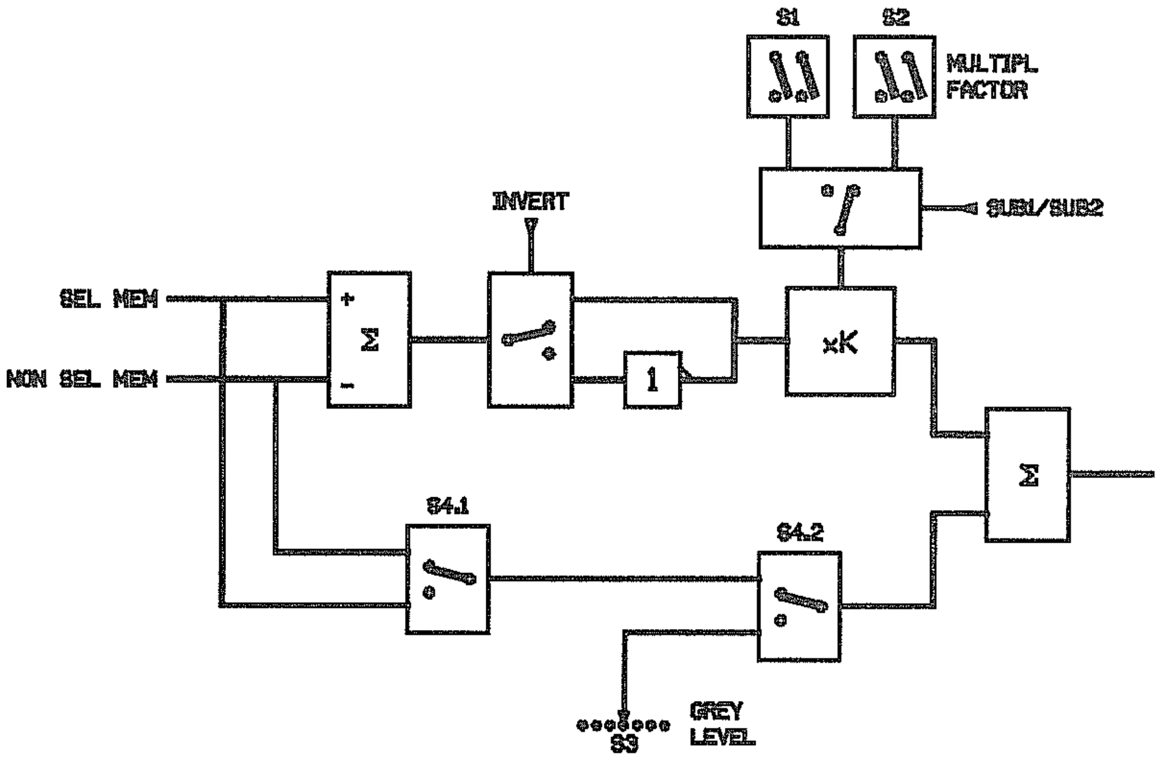


Figure 2: Simplified diagram of the subtractor board

SWITCH	SELECT	SELECTED FUNCTION
S1	 0 1 2 3	multiply factor (SUB1) 4 2 1 0.5
S2	 0 1 2 3	multiply factor (SUB2) 4 2 1 0.5
S4.2	open closed	selection from S4.1 selection from S3
S4.1	open closed	selected memory non-selected memory
S3	0 1 . . . E F	black grey level step ± 69 mV 0 - 94% white

Figure 3: Selection possibilities of the switches S1 -> S4 on the Subtractor board (WHD19).

3.3. Controller board (WHD25)

Depending upon the TV-line system of the applied video, the jumper WHD25:W1 has to be set in the position 50 Hz (1-2) or 60 Hz (1-3).

4. INSTALLATION INSTRUCTIONS

1. Mount the unit as described in the relevant Service Manual-System.

2. Set switches and jumpers in the for application required position (see relevant Service Manual-System).

<u>*NOTE*</u>
*Factory settings of switches and jumpers are marked **bold** in next tables*

SWITCHES	POSITION	SETTING
WHD11:S1	**OFF**	Test pattern OFF
WHD19:S1.1 :S2.1 :S3.1 :S4.1 :S4.2	**2** **1** **3** **Closed** **Open**	Multiply factor 1 for SUB1 Multiply factor 2 for SUB2 non selected memory added as background

Table for application settings

<u>Jumpersettings ADNR-board (4522 108 1962.):</u>

JUMPERS	POSITION	FUNCTION
WHD11:W1	1-2 **1-3** #	Noise reduction OFF Noise reduction ON (XTV8)

= In case of XTV5 camera, set jumper in position 1-2

<u>Jumpersettings Controller board (WHD25):</u>

JUMPERS	POSITION	FUNCTION
WHD25:W1	**1-2** @ 1-3	50 Hz 60 Hz

@ = set jumper in correct position

3. Connect cables to the rear of MDP-unit.

<u>*WARNING*</u>

When the 220V -supply cable (WHD-X1) has been connected, some parts of the unit will have a 220V tension (also when the power switch is in the OFF-position

CONNECTOR	FUNCTION
WHD-X1	220V supply
WHD-X2	system interface
WHD-X3	video input
WHD-X4	video output 1
WHD-X5	video output 2

Connections at rear of MDP-unit.

SECTION C: SETTING TO WORK

CONTENTS

1. INTRODUCTION

Pcb's are factory adjusted but in case of a disturbance of the adjustment, it can be necessary to re-adjust. Therefore in section F an additional description for adjustments is given.

NOTE
the unit does not work properly with PCB's on extender boards because of the high frequency used.

2. EQUIPMENT REQUIRED

- standard toolset

3. CONTROLS AND INDICATORS

3.1. AD CONVERTER/ADNR BOARD (WHD11)

- Led WHD11:H1 is lighting when the internal video is disturbed.

3.2. MDP OPERATIONAL FUNCTIONS

On the Local Control board (WHD20) commands can be given to select functions or modes. Local commands are overruled by remote commands. Acceptance of a command (both local or remote) is indicated by lighting of the appropriate LED on the Local Control board (WHD20).

3.2.1. Digital bypass

With digital bypass, the video signal passes the path: video in - ADC - DAC - video out, without memory store. Therefore:

- de-activate all local commands (no LED's on the Local Control board are lighting).

3.2.2. Processing functions

Applicable for both live and frozen images.

Gamma correction:

- activate GAMMA1 (curve 1) or GAMMA2 (curve 2).

Curve 1 is intended for contrast enhancement.
Curve 2 is intended for correction of film non-lineairity in hard copy units.

Subtraction:

The activated memory is the live image.

1. Activate MEM1 (SUB=MEM1-MEM2)
2. Activate SUB1 (SUB=MEM2-MEM1)
3. Activate INVERT (INVERT inverts subtraction result)

3.2.3. Noise reduction

Applicable for live images.

Last Image Hold:

1. Select a memory (MEM1 or MEM2)
2. Activate LIH and START

NOTE:
For live noise reduction, START must be active. De-activate START to freeze the noise reduced image.

3. Select noise reduction grade:

NR1: K=1/2
NR2: K=1/4
NR3: K=movement defined (K=1/4 -> 1/2)
NR4: K=movement defined (K=1/8 -> 1/4)

NOTE:
No selection of noise reduction grade will result in: K=1 (live image).

Electronic Radiography:

1. Select a memory
2. Activate ER and START
3. Select number of images for integration:

NR1: N=2
NR2: N=4
NR3: N=8
NR4: N=16

4. De-activate START after appearence of the frozen image.

3.2.4. Trace

1. *Select a memory*
2. Activate TRACE and START

NOTE:
For live tracing, START must be active. De-activate START to freeze the traced image.

3. Select trace-white or trace-black:

NR1: white
NR2: black

NOTE:
NR3, NR4 or no selection disables the TRACE

4. ADJUSTMENT FACILITIES

AD Converter board / ADNR board (WHD11)

Potentiometer WHD11:R1 adjusts the maximum amplitude for the AD convertor (factory adjusted to video amplitude of 1100 mV).

Measuring points on front of the board:

MEARURING POINT	VALUE
WHD11:-5V	-5V
WHD11:+5V	+5V
WHD11:-12V	-12V
WHD11:0V	0V
WHD11:+12V	+12V

Memory board 1 (WHD15) and Memory board 2 (WHD17)

WHD15/17:R1 : adjustment output amplitude (factory-adjusted to 1100 mV).

WHD15/17:MP1 : measuring point for video output.

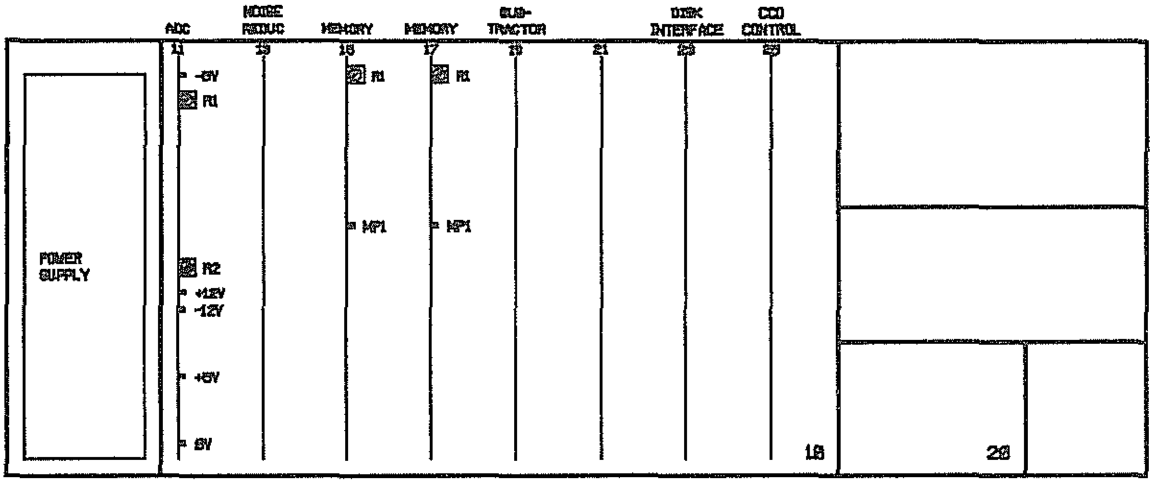


Figure 1: Measuring and adjusting points at the front of the MDP-rack

5. SETTING UP AND TESTING

This paragraph describes the setting up and functional test of an installed unit. Therefore if the related Service Manual-System prescribes other or additional checks, follow these instructions.

The MDP-unit is factory adjusted to an input-to-output ratio of 1 ± 5% (at 1100 mV) and needs no further adjustment.

NOTE
After switching ON (or OFF), wait 30 seconds before switching off (or on) again.

1. Prior to power-on, check the correct settings of jumpers and switches, the proper connection of cables and the unlock position of the shipping security, as described in section B.

2. Switch power on and check:

   a. Power-on lamp WHD:H1 is lighting.
   b. All LED's on Local Control board (WHD20) are lighting up for about 1 second.

3. For a new delivered MDP-unit, the AD/ADNR- and Memory-boards are factory adjusted to an input-to-output ratio of 1:1 (at 1100 mV) and need no further adjustment.

4. Check all the processing functions as mentioned in paragraph "Controls and indicators" of this section.

SECTION F: CORRECTIVE MAINTENANCE

CONTENTS

1. INTRODUCTION

This section gives procedures for adjustments, replacements and identification of a faulty power supply or faulty pcb's. Pcb's are to be replaced and not repaired.

2. EQUIPMENT REQUIRED

- standard toolset
- multimeter (Ri>10 Mohm)
- oscilloscope (dual channel)

3. ADJUSTMENTS

Place jumper WHD11:W1 in position 1-2 (if present).

For the correct adjustment it is necessary to follow the sequence of the procedure:

1. Output gain
2. Input offset
3. Overall gain

During the adjustments the outputs WHD:X4 and WHD:X5 of the unit should be connected to either a 75 ohm impedance or a monitor (75 ohm termination).

IMPORTANT
The remote control connector WHD-X2 must be disconnected.

If the measured video-signal on WHD15/17:MP1 (Memory boards) contains too much noise, use the output connector (WHD:X4 or WHD:X5).

After adjustment, place jumper WHD11:W1 in position 1-3 (if present).

Output gain

1. Switch the power on.
2. Set on the AD Converter/ADNR board the switch WHD11:S1 in position 'test'.
3. Connect measuring point WHD15:MP 1 of Memory 1 or output WHD:X4 to channel A of an oscilloscope.
4. Measure a staircase pattern like the one in fig. 1.
5. Adjust with potentiometer WHD15:R1 on Memory 1 board, the maximum amplitude of the signal to 1100 mV ± 5%.
6. Connect measuring point WHD17:MP 1 of Memory 2 board or output WHD:X5 to channel B of the oscilloscope.

7. The pattern on channel B must be covering the pattern on channel A. This can be accomplished by the adjustment of potentiometer WHD17:R1 on Memory 2.

8. Switch the test-switch WHD11:S1 off.

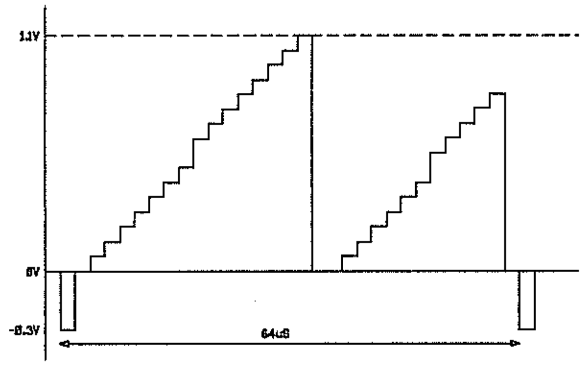


Figure 1: The generated test-pattern

Input offset

1. Disconnect input-signal on connector WHD:X3 of the unit.

2. Turn the potentiometer WHD11:R2 on the AD Converter/ADNR board fully counter clock wise (ccw). On the oscilloscope a DC-level with sync-pulses appears.

3. Turn the potentiometer WHD11:R2 slowly clock wise (cw). The DC-level will decrease with steps of 4 mV. (Can only be seen with a 1:1-probe).

4. Turn the potentiometer WHD11:R2 cw until the DC-level just equals zero.

Overall gain (1:1)

1. Apply on WHD:X3 video (from the system).

2. Measure on WHD:X3 and on WHD17:MP1 of Memory 2 or output WHD:X5 the amplitude of the video-signal.

3. Adjust with potentiometer WHD11:P1 on the AD Converter/ADNR board the input gain. The input/output-ratio must be 1.

4. Check the adjustment procedure as follows.

5. Change the connection of the oscilloscope from Memory 2 to Memory 1 and measure the amplitude of the output video signal from Memory 1.

6. If both ratio's are 1 then the adjustments are correct. If not, then the total adjustment procedure has to be repeated.

4. REPLACEMENTS

Sometimes inserting of the power supply unit in the glider entry causes problems. It is possible to remove the front support (plate) of the power supply unit first. After placing the power supply in the glider, the support can be mounted again.

5. FAULT FINDING PROCEDURE

5.1. INTRODUCTION

IMPORTANT
Disconnect the remote control connector (WHD-X2) to enter TEST-mode.

WARNING
Although the power switch is in the OFF-position, some parts of the unit stil have a 220V tension!!

CAUTION
Before inserting, connecting or disconnecting boards or wiring, always switch OFF the power supply!!

NOTE
The unit does not work properly with PCB's on extender boards because of the high frequency used

5.2. POWER SUPPLY

(see chapter 5.1., IMPORTANT, WARNING, CAUTION and NOTE).

1. Remove front cover and switch the unit on.

2. Check if 220V is present (watch the neon indicator).

3. Measure on the measuring points WHD11: +12V, +5V, -5V and -12V of the AD Converter board if the correct voltages are present (tolerance ± 5%).

4. When the correct voltages are not present, successively disconnect the flatcable connections at the Controller (WHD25) and measure the voltages. When correct, the Local Control Board (WHD20) or the flatcables are defective. Replace or change successively.

5. When still not correct, disconnect with the exception of the AD Converter/ADNR board (WHD11) all the boards. Measure again the voltages. When correct, one of the boards is defect. Replace successively to find out which one.

6. In case of fault change successively the AD Converter/ADNR board and power supply. When no voltages present, the backpanel or wiring is defective.

7. Switch OFF the power.

NOTE
After using a new AD Converter/ADNR board and/or a new power supply, check the adjustments mentioned in chapter 3.

5.3. MDP-FUNCTION

(see chapter 5.1., *IMPORTANT, WARNING, CAUTION* and *NOTE*.

1. Remove the front cover and switch the unit off.

2. Disconnect/remove with the exception of the AD Converter/ADNR board all the boards.

5.3.1. Controller/Local Control-board

Boards connected : AD Converter/ADNR board (WHD11).

1. Insert the Controller-board (WHD25) and connect the Local Control-board (WHD20).

2. Switch the power on. All LED's on the Local Control-board are on for about 10sec. After that time they should ALL be off.

3. If this has not happened, change successively, after the power has been switched off, the AD/ADNR-, Controller- and Local Controller-board and the flat-cable connection.

4. Test again. If the problem is not solved, the backpanel is defective.

5.3.2. Analog Bypass

Boards connected: AD Converter/ADNR board (WHD11)
Controller (WHD25)
Local Control-board (WHD20)

1. Switch the power off.

2. Insert Memory 1 (WHD15) and connect the video-cables between the AD Converter/ADNR board (WHD11) and Memory 1 (WHD15) and between Memory 1 (WHD15) and connector WHD:X4.

3. Apply a video-signal to connector WHD:X3 of the unit.

4. Watch the output-video from connector WHD:X4 on a monitor. If this is not present, it will be caused by one of the following faults:

   . inputrelais AD Converter/ADNR board defective.
   . outputrelais Memory 1 defective. Exchange Memory boards to check.
   . video-cables defective.

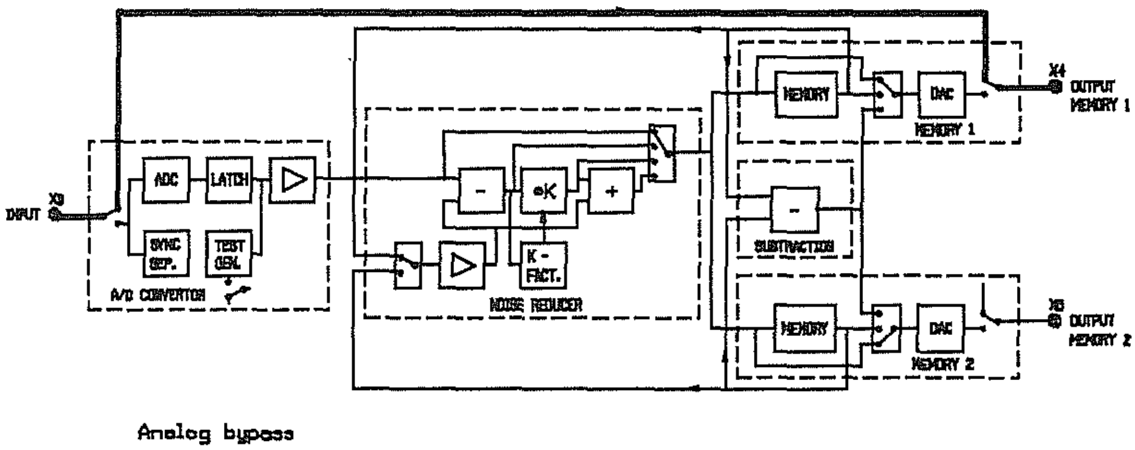


Figure 2: Analog bypass

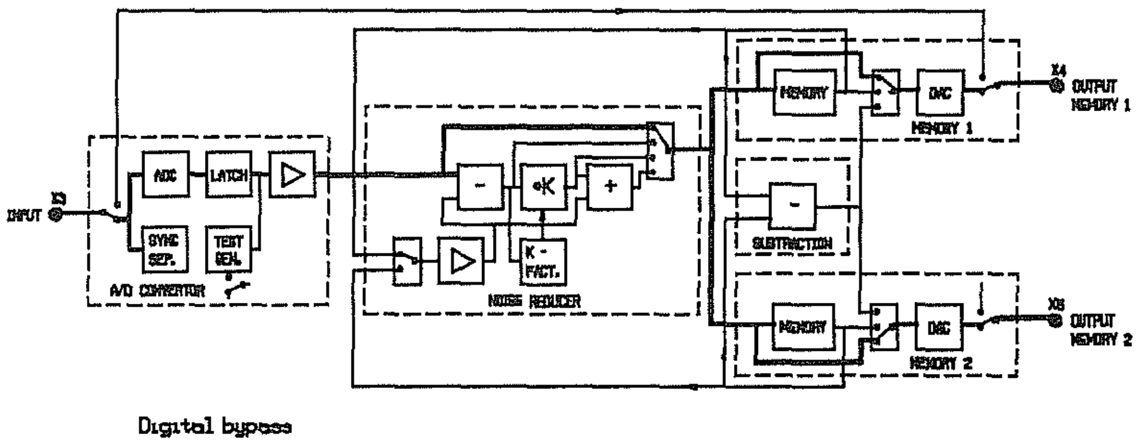


Figure 3: Digital bypass

5.3.3. Digital Bypass

Boards connected: AD Converter/ADNR board (WHD11)
Controller (WHD25)
Local Control-board (WHD20)
Memory 1 (WHD15)

1. Place jumper WHD11:W1 in position 1-2 (if present).

2. Insert the Noise Reducer-board (WHD13), the second Memory board (WHD17) and connect the video-cables between Memory 2 (WHD17) and connector WHD:X5.

3. Switch the power on. Check again if all LED's on the Local Control-board (WHD20) are on for about 10 sec., when not change the AD Converter/ADNR board (WHD11).

4. Video must be again present on connector WHD:X4 and because of the second memory also on connector WHD:X5. If the video is not present a Memory, AD Converter/ADNR or Noise reducer board can be defective.

5. After test, place jumper WHD11:W1 in position 1-3 (if present).

5.3.4. Test Generator

Boards connected: AD Converter/ADNR board (WHD11)
Controller (WHD25)
Local Control-board (WHD20)
Memory 1 (WHD15)
Memory 2 (WHD17)
Noise reducer (WHD13)

1. Place jumper WHD11:W1 in position 1-2 (if present).

2. Switch with the switch WHD11:S1 on the AD Converter/ADNR board the test generator on. A staircase video-signal is generated, resulting in two white-to-black bar patterns on the monitor screen. If not the AD Converter/ADNR board is defective.

3. Place jumper WHD11:W1 in position 1-3 (if present).

5.3.5. Noise Reducer Functions

Boards connected: AD Converter/ADNR board (WHD11)
Controller (WHD25)
Local Control-board (WHD20)
Memory 1 (WHD15)
Memory 2 (WHD17)
Noise reducer (WHD13)

setting: switch WHD11:S1 -> on

In case of AD converter board (up to 4522 107 87053):

1. Press switch LER on the Local Control-board.

2. Press switch LNR1 to select subtract circuit of Noise reducer-board and with a oscilloscope measure the signal on connector WHD:X4 or watch the monitor screen of Memory 1 (WHD15) (fig 4b). A DC-voltage of 550 mV with sync pulses can be measured or on the monitor a grey level can be seen.

3. Press switch LNR2 to select add circuit in addition (fig 4c). Nothing should change.

4. Press switch LNR3 to select multiplication circuit in addition (fig 4.d). The original staircase can be measured or on the monitor the bar pattern can be seen.

5. Press LER and LNR3 again to reset the functions.

6. Repeat the test but instead of pressing key LER use key LLIH. Measure the signal on connector WHD:X5 or watch the monitor screen of Memory 2 (WHD17).

7. When only function LER is faulty, change Memory 1 (WHD15). When only function LLIH is faulty, change Memory 2 (WHD17). When both functions are faulty, or when LNR1 works fine but LNR2 or LNR3 does not, change the Noise Reducer-board (WHD13).

8. Repeat the tests. If there is still something wrong, change the backpanel.

In case of ADNR board (4522 108 1962.):

To test the MDPM noise reducer function, follow the same procedure as descibed by the AD converter board (see above).
On the ADNR PCB an extra noise reduction function (for XTV-8) is available. This extra function can be tested as follows:

1. Place jumper WHD11:W1 in position 1-3

2. Switch OFF the MDPM noise reducer function (Switch off: LNR1, LNR2, LNR3 and LNR4 on local control board).

   The following signals must be active:

   . START
   . LIH
   . MEM1 or MEM2

3. Obtain a moving noisy image (fluoroscopy with moving object)

Results: when the image does not corresponds with one or more of next points, replace ADNR board.

1. The image must contain less noise in case the noise reduction function is activated.
   To compare, change jumper position WHD11:W1 1-2 and 1-3.
2. During fluoroscopy, in the image moving artefacts (smearing) must be visible.
3. The outcoming video image may not contain irregularities.

5.3.6. Subtractor-board

Boards connected and settings : see paragraph "Noise Reducer Functions"

1. Switch the power OFF.

2. Mark the settings of the switches WHD19:S1, S2, S3 and S4.2 of the Subtractor-board.

3. Select "grey-level" (switch WHD19:S4.2 closed) and select 3 for the level with switch S3.

4. Select for LSUB1 a multiplication factor 1 (switch WHD19:S1 position 2) and for LSUB2 a multiplication factor 2 (switch WHD19:S2 position 1).

5. Insert the Subtractor-board.

6. Disconnect the input video from WHD:X3, switch the power on and store the test-pattern in Memory 1 by pressing the keys LLIH, LMEM1 and twice LSTART on the Local Control-board.

7. Switch off the test-pattern and store the black level in Memory 2 by pressing LMEM2 and twice LSTART.

8. Subtract the memory images by pressing key LSUB1.

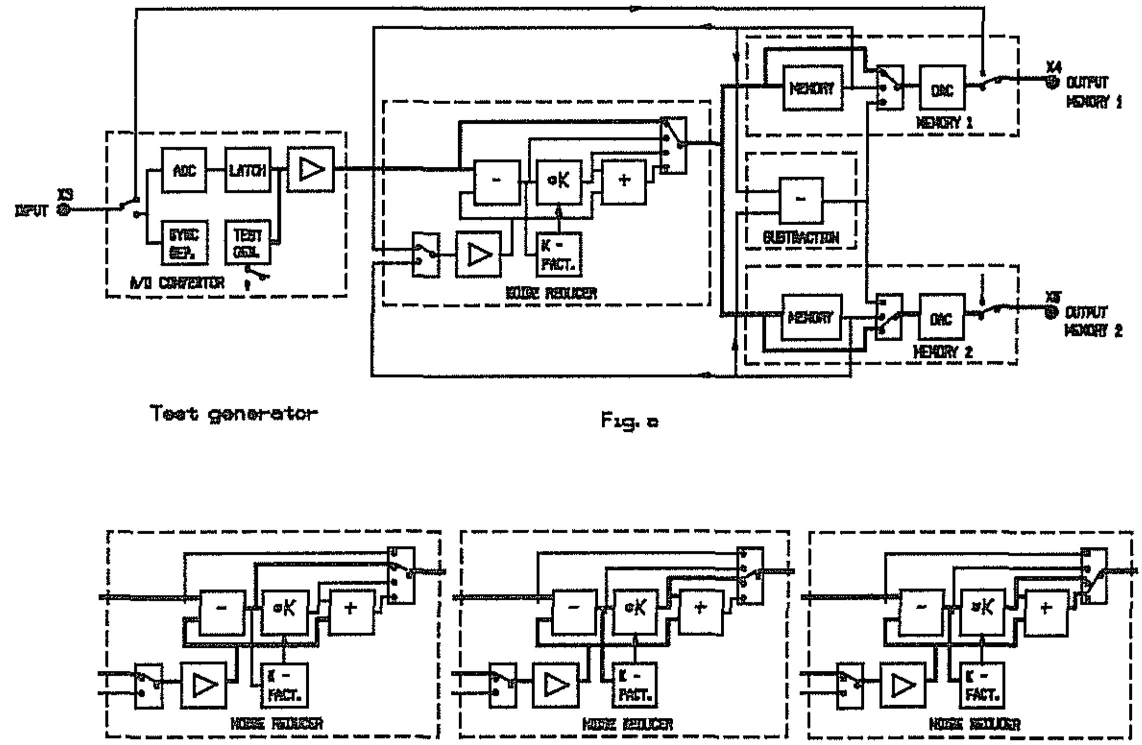
9. Return to memory 1 (LMEM1). The result is a new bar pattern. If we compare this pattern with the original one we can see that the new one has a much larger white bar which is the result of the addition of the grey level with the test-pattern.

KEYS	CLIPPED BAR
SUB1	white (small)
SUB1, INVERT	black (large)
SUB2	white (medium)
SUB2, INVERT	black (very large)

Figure 4 : Keys on the Local Control-board.

10. Repeat the subtract function. Instead of using LSUB 1 use the keys selections of fig. 4.

11. Switch the power off, pull out the Subtractor-board and exchange it when something was incorrect else reset the original switches settings and insert the board.

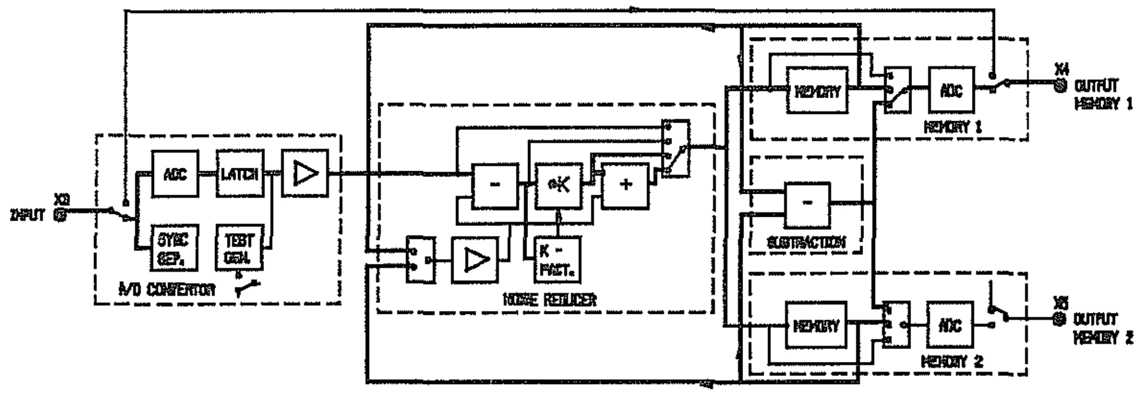


Test generator

Fig. a

Fig. b Fig. c Fig. d

Figure 5: a) Test generator, b) Test mode NR1, c) Test mode NR2, d) Test mode NR3



Subtraction

Figure 6: Subtraction

5.3.7. Gamma Corrections

All boards connected
switch WHD11:S1 -> on

1. Switch the power on.
2. Select Memory 1 (LMEM1).
3. Measure with an oscilloscope on connector WHD:X4. If you press one of the two gamma correction keys the level of some steps of the staircase will change.
4. Test both gamma corrections. When incorrect change Memory 1 (WHD15).
5. Repeat the test for Memory 2. Select Memory 2 (LMEM2) and measure on WHD:X5.

SECTION G: EXPLANATIONS

CONTENTS

1. INTRODUCTION

See diagram Z1.2.

In diagram Z1.2. 6 pcb's can be discerned (see also figure 1.). On the AD Converter/ADNR board the applied analog video-signal is converted into an 8 bit digital signal and sent to the Noise Reducer. On the Noise Reducer some noise reduction functions are possible, using the images coming from the AD Converter/ADNR board and from the selection of one of the two Memory boards. The image at the output of the Noise Reducer is saved in the selected memory.
Each memory has a DAC, so the contents of each memory can be displayed on a monitor.
Using the Subtractor and the DAC on one of the two memory boards, the contents of the memories can be subtracted and displayed on a monitor, without effecting the contents of the memories.
On the Controller a micro-processor is used for the mode selection and timing- and control-signals.

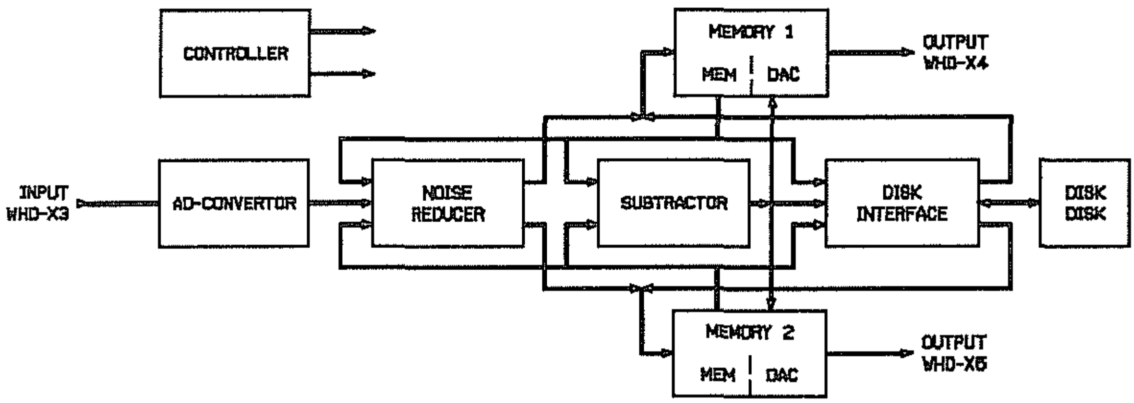


Figure 1: Functional block diagram of the MDP-unit

2. AD CONVERTER- or ADNR- BOARD

The input video is connected to WHD:X3 and via bypass- switch and buffer sent to the clamping circuit. After clamping the video to 0 V, the video is converted into an 8 bit digital signal. Then in case of ADNR-board, recusive filtered and after that buffered (outputbus AD-OUT 0 to 7).
For test purpose a digital staircase is generated (WHD11:S1 on TEST) resulting in two white-to-black bar patterns on the monitor.
The sync pulses from the video are separated into horizontal and vertical sync pulses and buffered (output signals V-pulse and H-pulse).
The sync detector/oscillator detects if no sync pulses are present and then generates X-tal controlled sync pulses.
The PLL-oscillator, locked by the horizontal sync, is running at a frequency of about 40 MHz; after clipping, pulse stretching, dividing by two and buffering we get signals CLOCK and CLOCK-N of 20 MHz.
The clock signals, sent to the processor and the memory boards, are synchronised with the incoming video-syncs.

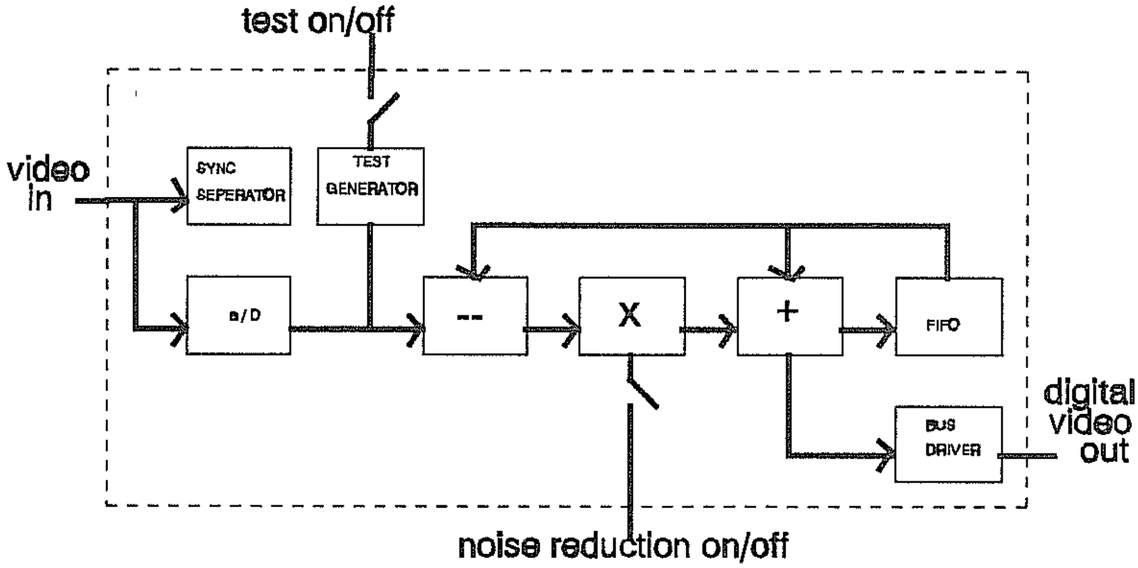


Figure 2: Simplified diagram of the ADNR-board

3. NOISE REDUCER BOARD

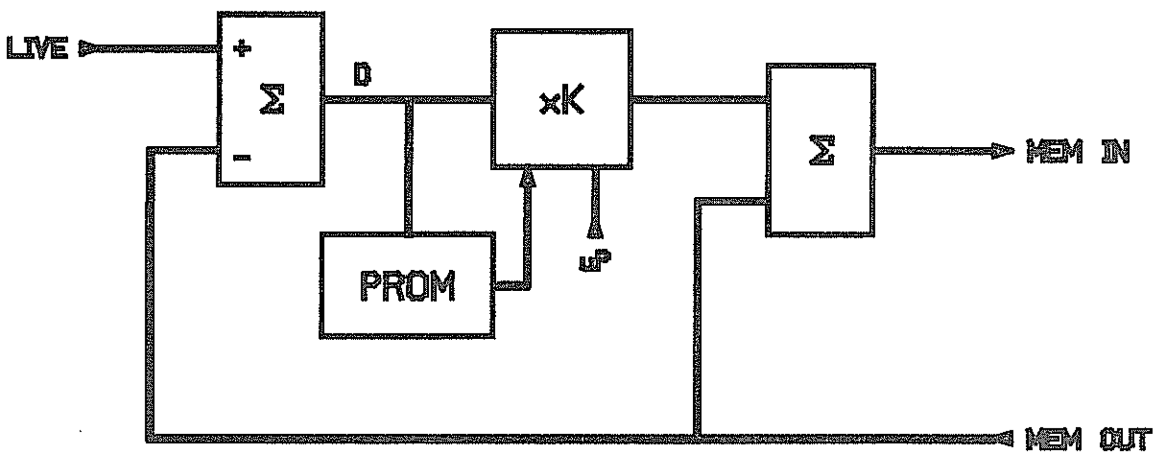


Figure 3: Simplified diagram of the noise reducer

The selected memory signal, from Memory 1 (WHD15) or Memory 2 (WHD17), is subtracted from the live signal and the result is multiplied with a factor K ($0<K<1$) and then added to the selected memory signal.

The factor K:

Fixed K : Value K is supplied by the processor (K=1/4 or 1/2).
Moving K : Dependent upon the value of the subtracted signal (D) a PROM makes a K-factor (K=1/4 <-> 1/2 or K=1/8 <-> 1/4, application requirments).
Tracing K : The factor K is defined by the selection trace white/trace black and by the value of the subtracted signal D.
This results in storage of the minimum respectively maximum value of each pixel.

	TRACE WHITE	TRACE BLACK
D>0	K=1	K=0
D<0	K=0	K=1

4. MEMORY BOARD (Memory 1 and Memory 2 are identical)

After buffering, the digital video is set in the Charge-Coupled-Device (CCD) memory. Via the output and input switches of the CCD memory (field 1 and 2) the memory is refreshed.
The output of the CCD memory is buffered and sent to the noise reducer and subtractor. The selector switch chooses between the output of the CCD and the output of the subtractor.
The digital to analog convertor (DAC) gets its input from the selector switch which selects:

a. Input-video of memory.
b. Output-video of CCD memory/Output-video of subtractor.
c. Gamma corrected signal as b.

5. SUBTRACTOR BOARD

Figure 4 gives a siplified diagram of the subtractor.

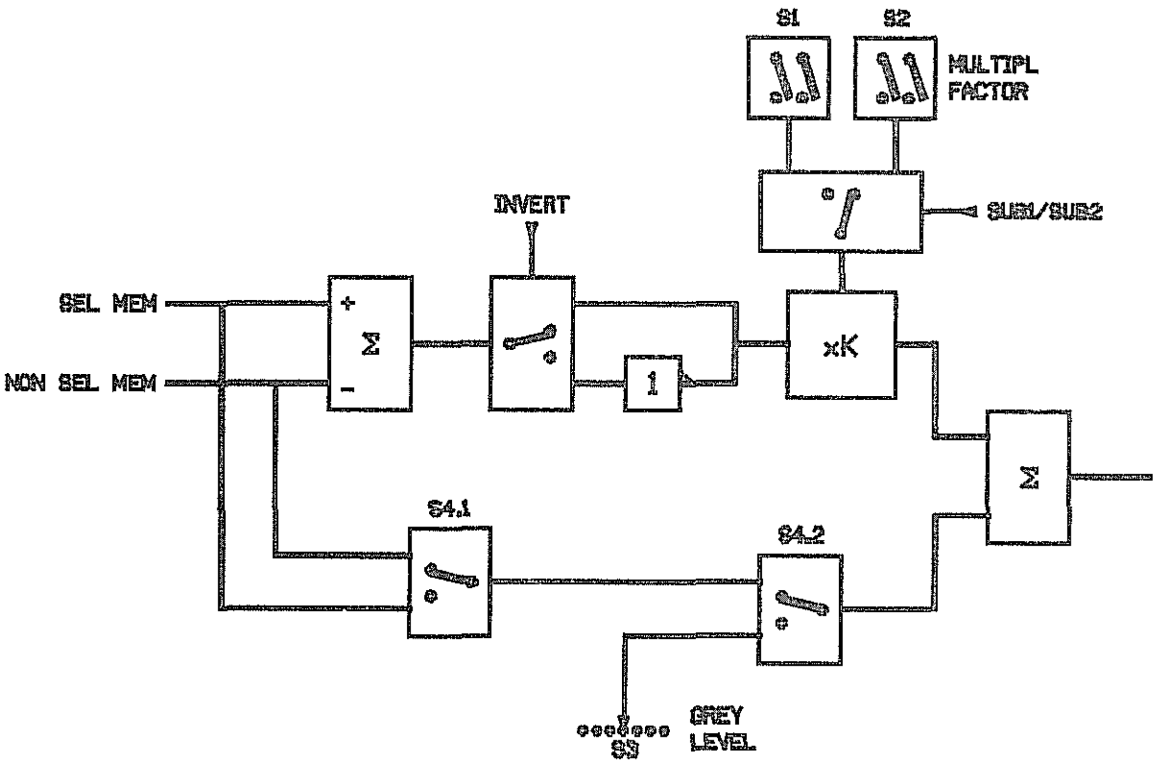


Figure 4: Simplified diagram of the subtractor

With the switches S1 - S4 and the keys LMEM 1, LMEM 2, LSUB 1, LSUB 2 and LINVERT on the Local control-board the next algorithm can be filled in.

INVERT * (SEL - NON SEL) * MULT.FACTOR + ADDITION

Where:

- LMEM 1 or LMEM 2 is the memory which is marked as SEL (SELECTED). (NON SEL=NON SELECTED memory).
- LSUB 1 or LSUB 2 selects the multiplication factor which is set by the switches S1 and S2 (see fig. 3).
- LINVERT: non active= -1; active= +1.
- Addition is filled in by the switches S4.1, S4.2 and S3. (See fig. 3).

After latching memory 1 and 2, one of the memory busses is inverted and added to the other (non-inverted) memory bus resulting in : Memory 1 - Memory 2.
The subtracted digital video-signal is multiplied by a factor 1/2, 1, 2 or 4 and added to a selected background. This selected background is one of the next three possibilities:

a. Image from Memory 1.
b. Image from Memory 2.
c. Grey-level.

If the subtracted and multiplied digital video signal is negative or the amplitude is too high, the signal is limited:
The negative signal is converted to black level and the signal level higher than the maximum amplitude is set to white level.

6. CONTROLLER BOARD

The microprocessor on the Controller board is driven by clock pulses, being generated on the AD Converter/ADNR board. Those pulses have been synchronised to the horizontal and vertical sync pulses of the video-signal. When no video sync pulses are present, then an internal generator on the AD Converter/ADNR board supplies the sync-pulses.
On-board timers generate internal and external timing signals, which are transferred to the data control bus through output X2 A15 : C27.

Philips Medical Systems

parts list

Philips Medical Systems Nederland B.V. | Technical Service | Best

SERVICE PARTSLIST UNIT

PEI: 9807 721 02001

DESCRIPTION: DIGITAL SCOPOFIX MDP

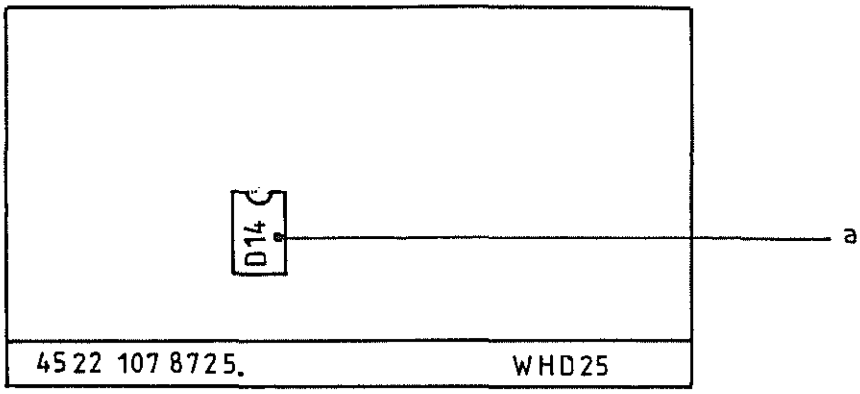
SERIAL NR:

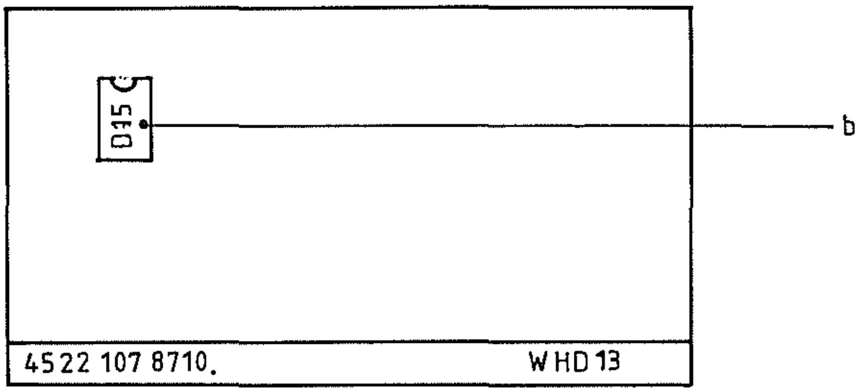
List of pages and drawings

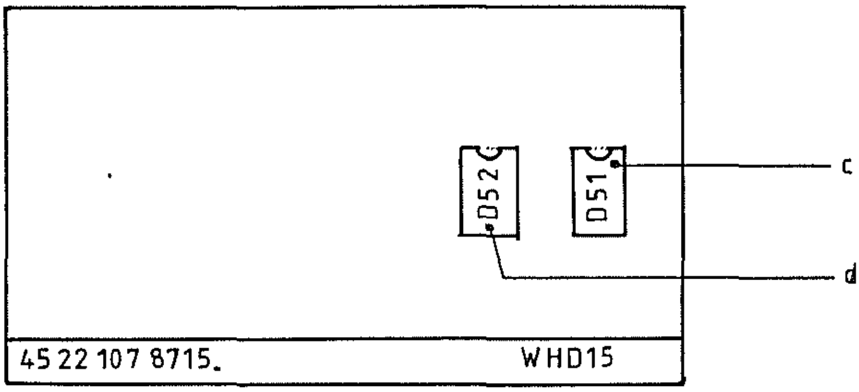
*printing instructions 4522 983 32261

SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
	WHD11X3-WHD15X3	4522 103 73462	coax cable B	
	WHD20X1-WHD25X3	4522 103 73741	flatcable	34p
	WHDX2-WHD25X5	4522 103 73702	flatcable	50p
	WHDX3-WHD11X4 WHDX4-WHD15X4 WHDX5-WHD17X4	4522 103 73711	coax cable A	
WHD	F1	2432 088 00051	fusebase 250V	
WHD	F1	2432 088 00052	fusecarrier 20	
WHD	F1	2432 088 00053	fusecarrier 32	
WHD	F1	2422 086 01266	UL-fuse time-lag 2x	2A 250V
WHD	H1	2422 475 00026	lampholder	
WHD	M1	2822 031 01195	fan whisper 220V	
WHD	M1	4522 920 47461	vibration damper for fan	4x
WHD	M1	2422 070 98001	cordset for fan	
WHD	S1	2422 126 01029	rocker switch	250Vac
WHD	X1	2422 013 00041	connection block	2p
WHD	Z1	2712 171 00036	mains filter	

SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
WHD 9		9415 012 04301	power supply PE1204/30	
WHD10		4522 107 87001	backpanel digital memory	
WHD11		4522 108 19621	pcb ADNR	
WHD13		4522 107 87101	pcb noise reducer	
WHD15-17		4522 107 87156	pcb digital memory	2x
WHD19		4522 107 87201	pcb subtractor	
WHD20		4522 108 10851	local control	
WHD25		4522 107 87253	pcb controller dig. memory	
WHD25	D13	9336 681 10682	SRAM NVR2	
WHD25	D4	4522 103 39801	prom chipselect	
PZ-1	a-b-c-d	4522 103 95662	set proms	
		2422 034 17982	socket housing	48skt







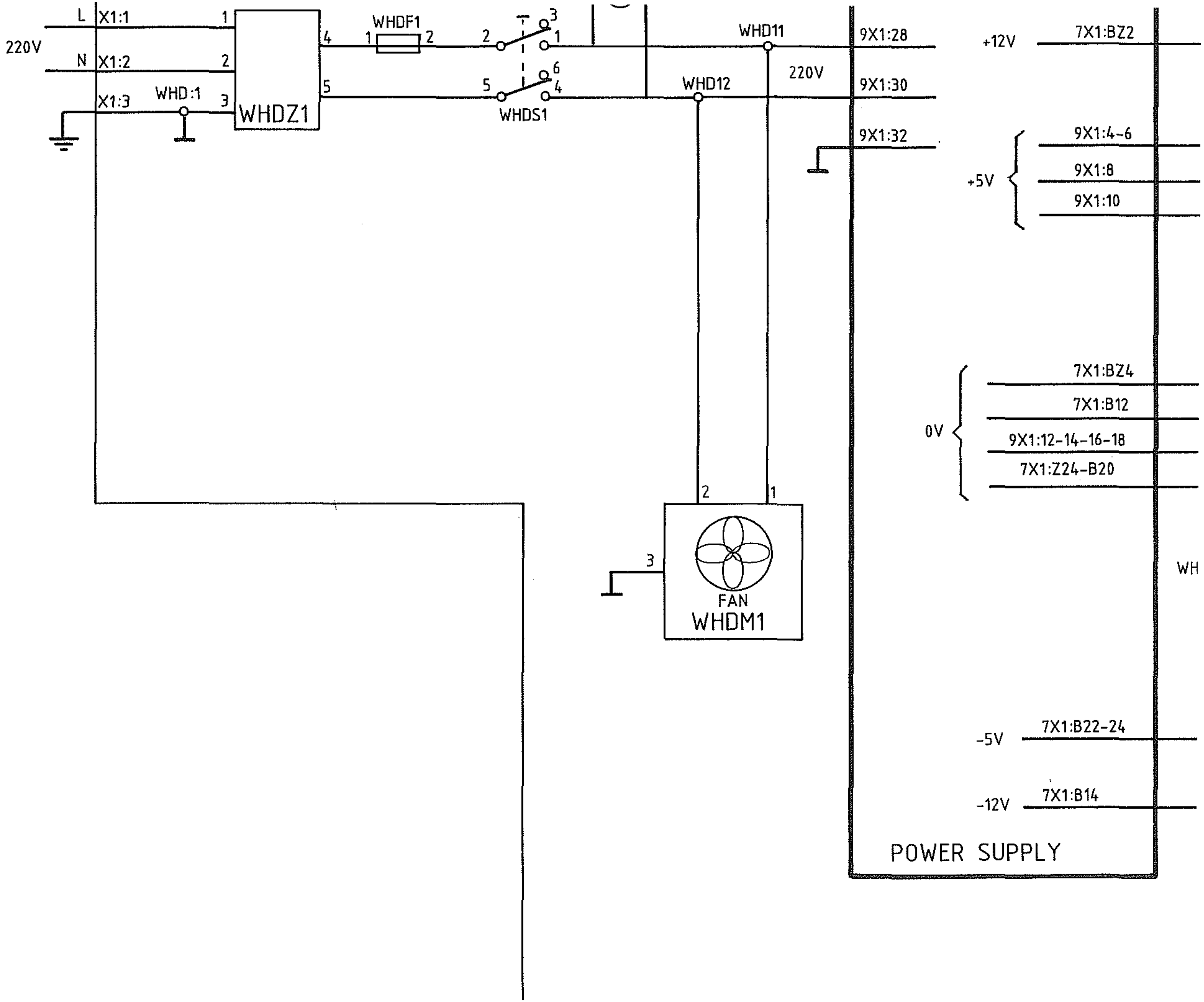
a = 4522 104 7294.
b = 4522 103 3983.
c = 4522 103 3984.
d = 4522 103 3985.

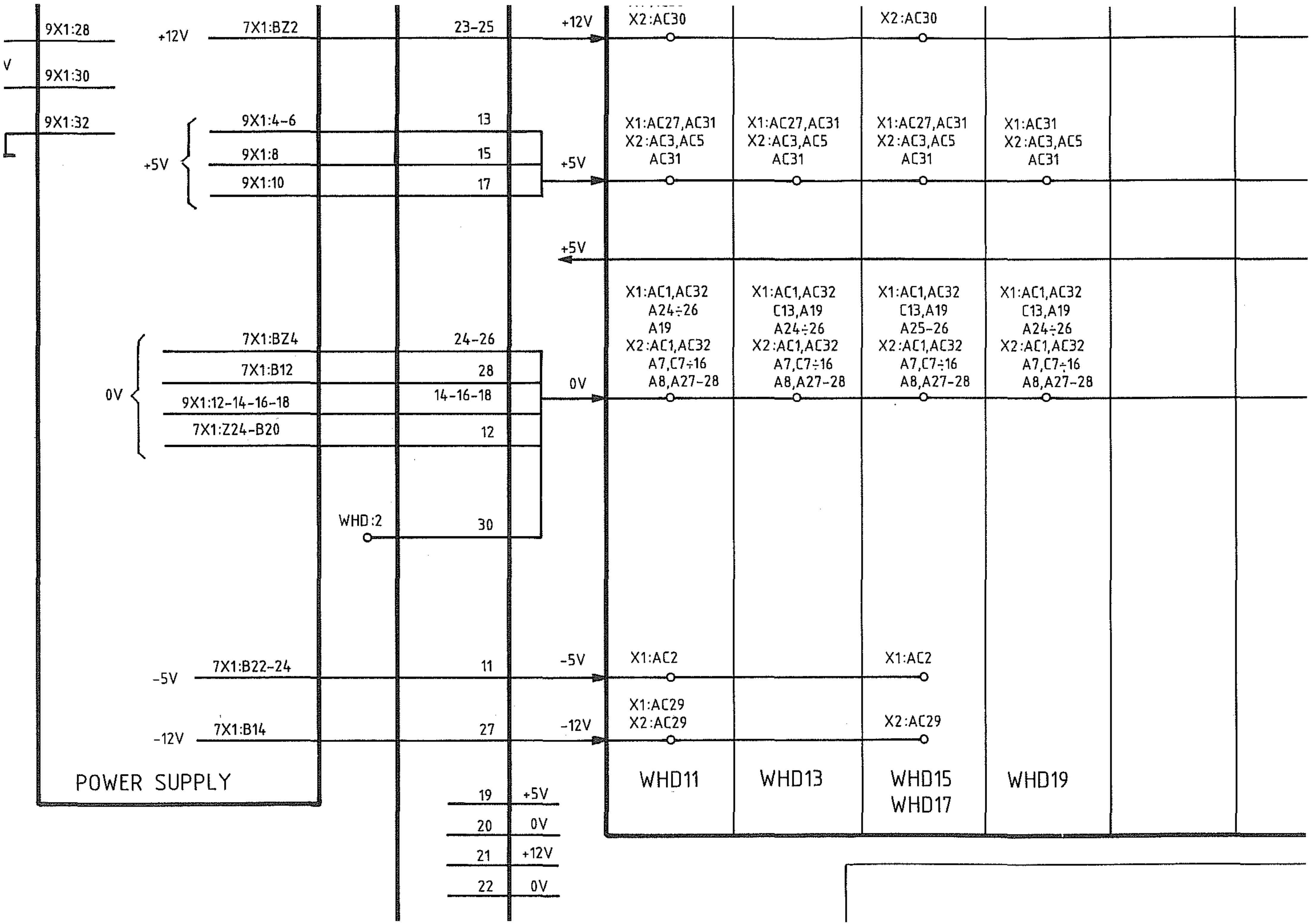
Section Z : DRAWINGS

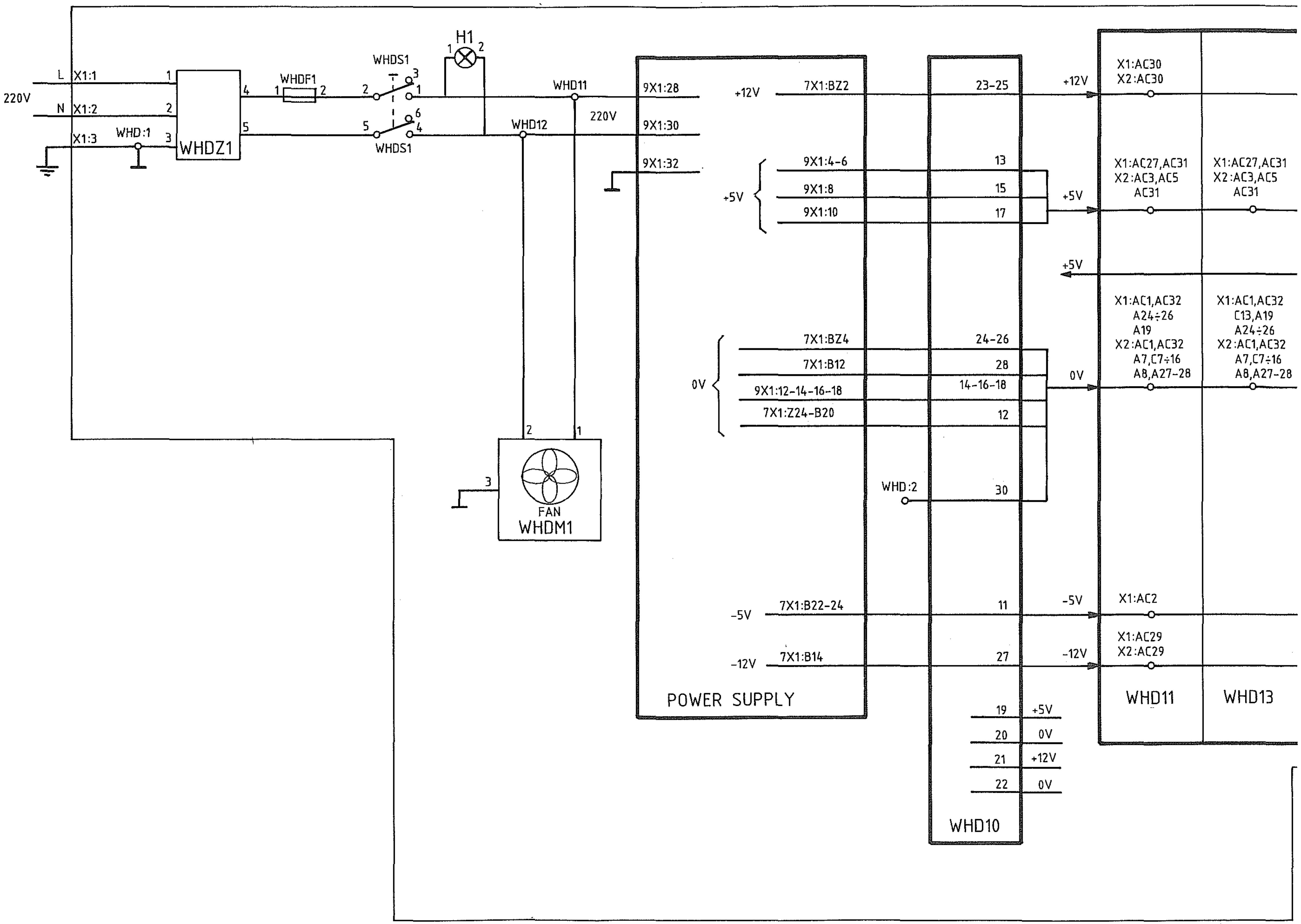
CONTENTS

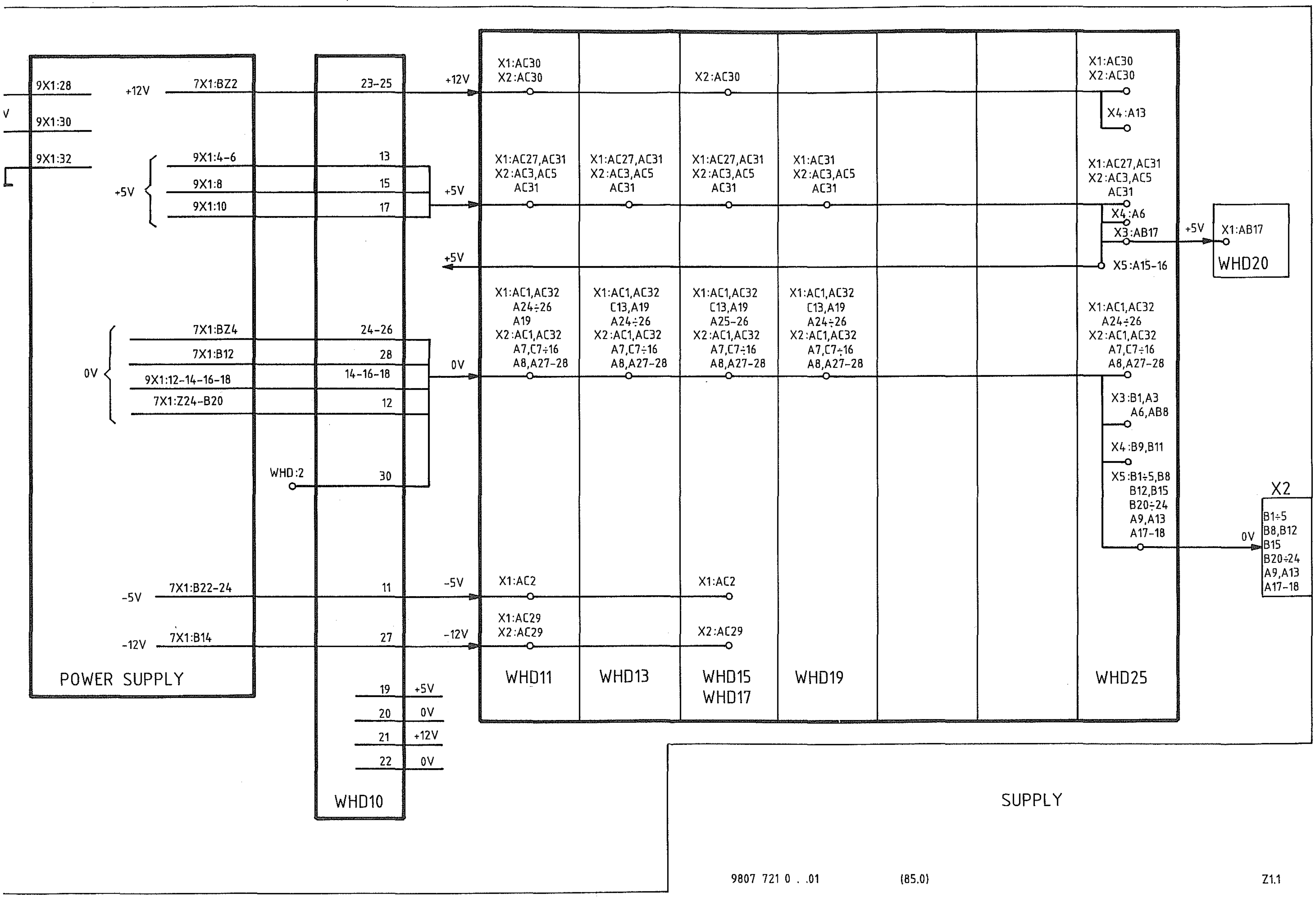
Section Z

Scopofix MDP




9X1:28
V
9X1:30
9X1:32
+12V
7X1:BZ2
23-25
+12V
X2:AC30
X2:AC30
+5V
9X1:4-6
13
9X1:8
15
9X1:10
17
+5V
X1:AC27,AC31
X2:AC3,AC5
AC31
X1:AC27,AC31
X2:AC3,AC5
AC31
X1:AC27,AC31
X2:AC3,AC5
AC31
X1:AC31
X2:AC3,AC5
AC31
+5V
X1:AC1,AC32
A24÷26
A19
X2:AC1,AC32
A7,C7÷16
A8,A27-28
X1:AC1,AC32
C13,A19
A24÷26
X2:AC1,AC32
A7,C7÷16
A8,A27-28
X1:AC1,AC32
C13,A19
A25-26
X2:AC1,AC32
A7,C7÷16
A8,A27-28
X1:AC1,AC32
C13,A19
A24÷26
X2:AC1,AC32
A7,C7÷16
A8,A27-28
0V
7X1:BZ4
24-26
7X1:B12
28
9X1:12-14-16-18
14-16-18
7X1:Z24-B20
12
0V
WHD:2
30
-5V
7X1:B22-24
11
-5V
X1:AC2
X1:AC2
-12V
7X1:B14
27
-12V
X1:AC29
X2:AC29
X2:AC29
POWER SUPPLY
19
+5V
20
0V
21
+12V
22
0V
WHD11
WHD13
WHD15
WHD17
WHD19

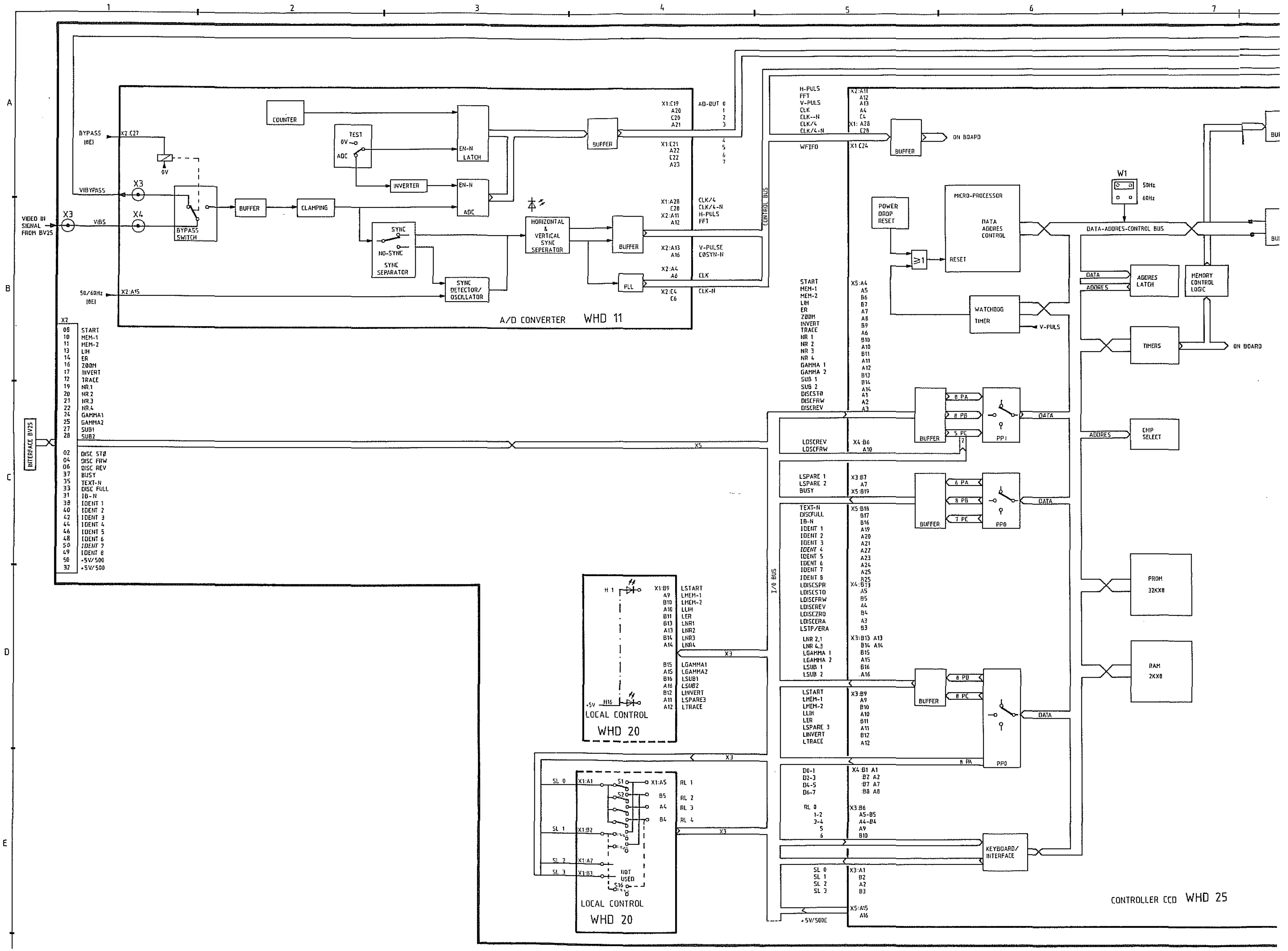

220V
L X1:1
N X1:2
X1:3
WHD:1
WHDZ1
WHDF1
WHDS1
H1
WHD11
WHD12
220V
FAN
WHDM1
9X1:28
9X1:30
9X1:32
+12V
7X1:BZ2
+5V
9X1:4-6
9X1:8
9X1:10
0V
7X1:BZ4
7X1:B12
9X1:12-14-16-18
7X1:Z24-B20
WHD:2
-5V
7X1:B22-24
-12V
7X1:B14
POWER SUPPLY
23-25
13
15
17
24-26
28
14-16-18
12
30
11
27
19 +5V
20 0V
21 +12V
22 0V
WHD10
X1:AC30
X2:AC30
X1:AC27,AC31
X2:AC3,AC5
AC31
X1:AC1,AC32
A24÷26
A19
X2:AC1,AC32
A7,C7÷16
A8,A27-28
X1:AC1,AC32
C13,A19
A24÷26
X2:AC1,AC32
A7,C7÷16
A8,A27-28
X1:AC2
X1:AC29
X2:AC29
WHD11
WHD13

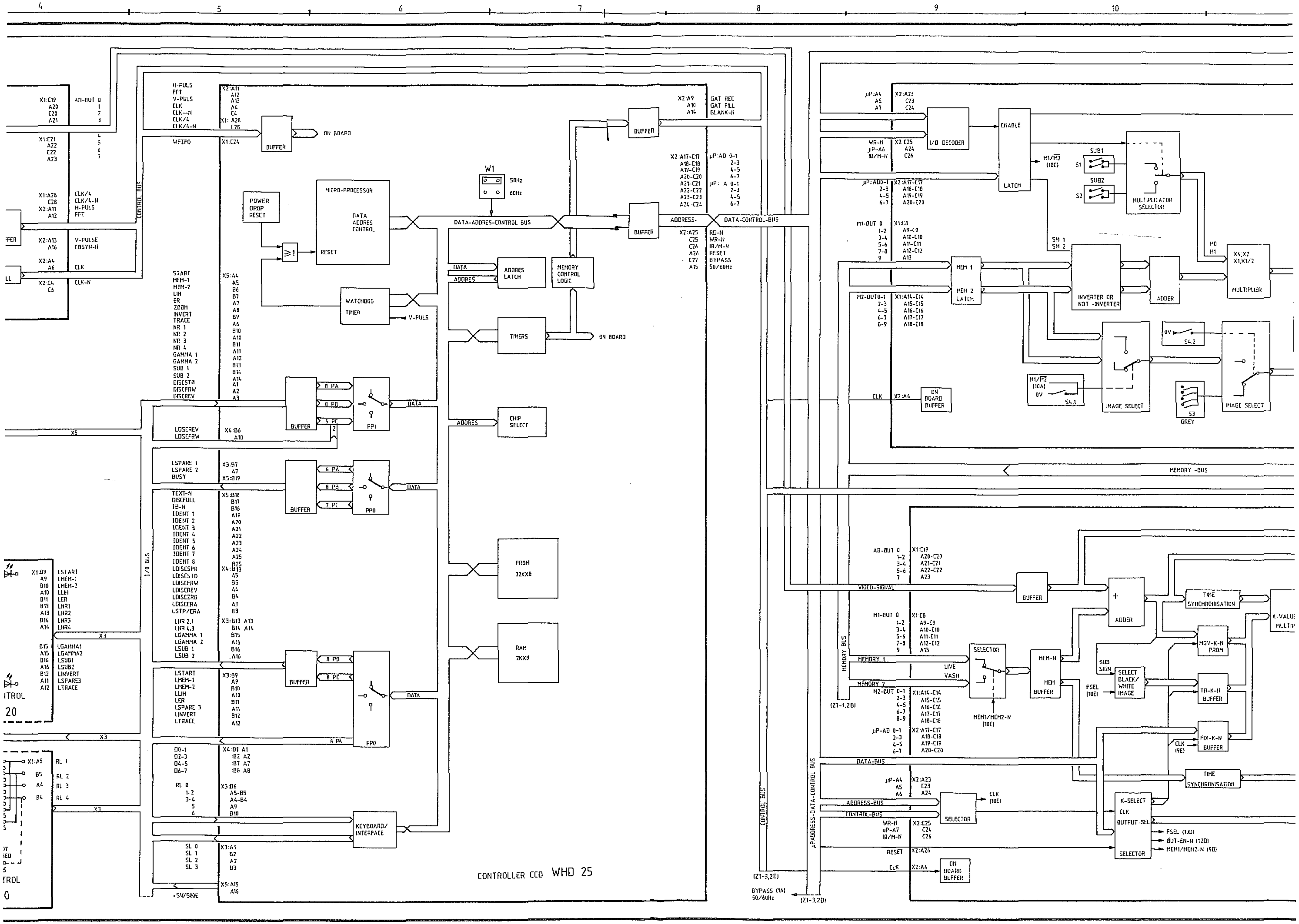


9X1:28
9X1:30
9X1:32
+12V
7X1:BZ2
+5V
9X1:4-6
9X1:8
9X1:10
0V
7X1:BZ4
7X1:B12
9X1:12-14-16-18
7X1:Z24-B20
WHD:2
-5V
7X1:B22-24
-12V
7X1:B14
POWER SUPPLY
23-25
13
15
17
24-26
28
14-16-18
12
30
11
27
19 +5V
20 0V
21 +12V
22 0V
WHD10
X1:AC30
X2:AC30
X1:AC27,AC31
X2:AC3,AC5
AC31
X1:AC31
X1:AC1,AC32
A24÷26
A19
X2:AC1,AC32
A7,C7÷16
A8,A27-28
C13,A19
A25-26
X1:AC2
X1:AC29
X2:AC29
X4:A13
X4:A6
X3:AB17
X5:A15-16
X1:AB17
WHD20
X3:B1,A3
A6,AB8
X4:B9,B11
X5:B1÷5,B8
B12,B15
B20÷24
A9,A13
A17-18
X2
B1÷5
B8,B12
B15
B20÷24
A9,A13
A17-18
WHD11
WHD13
WHD15
WHD17
WHD19
WHD25
SUPPLY

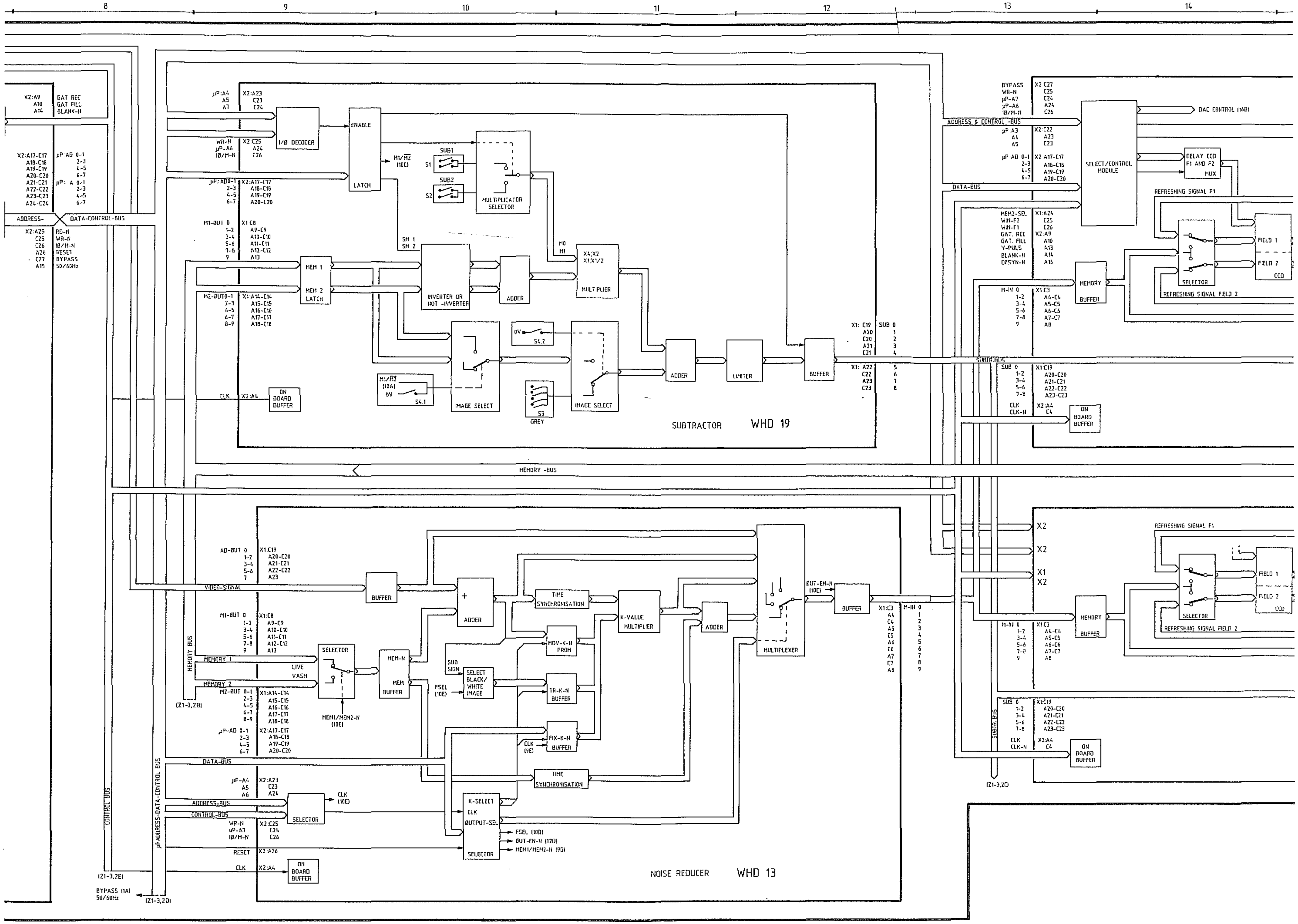
Section z

Scopofix MDPM

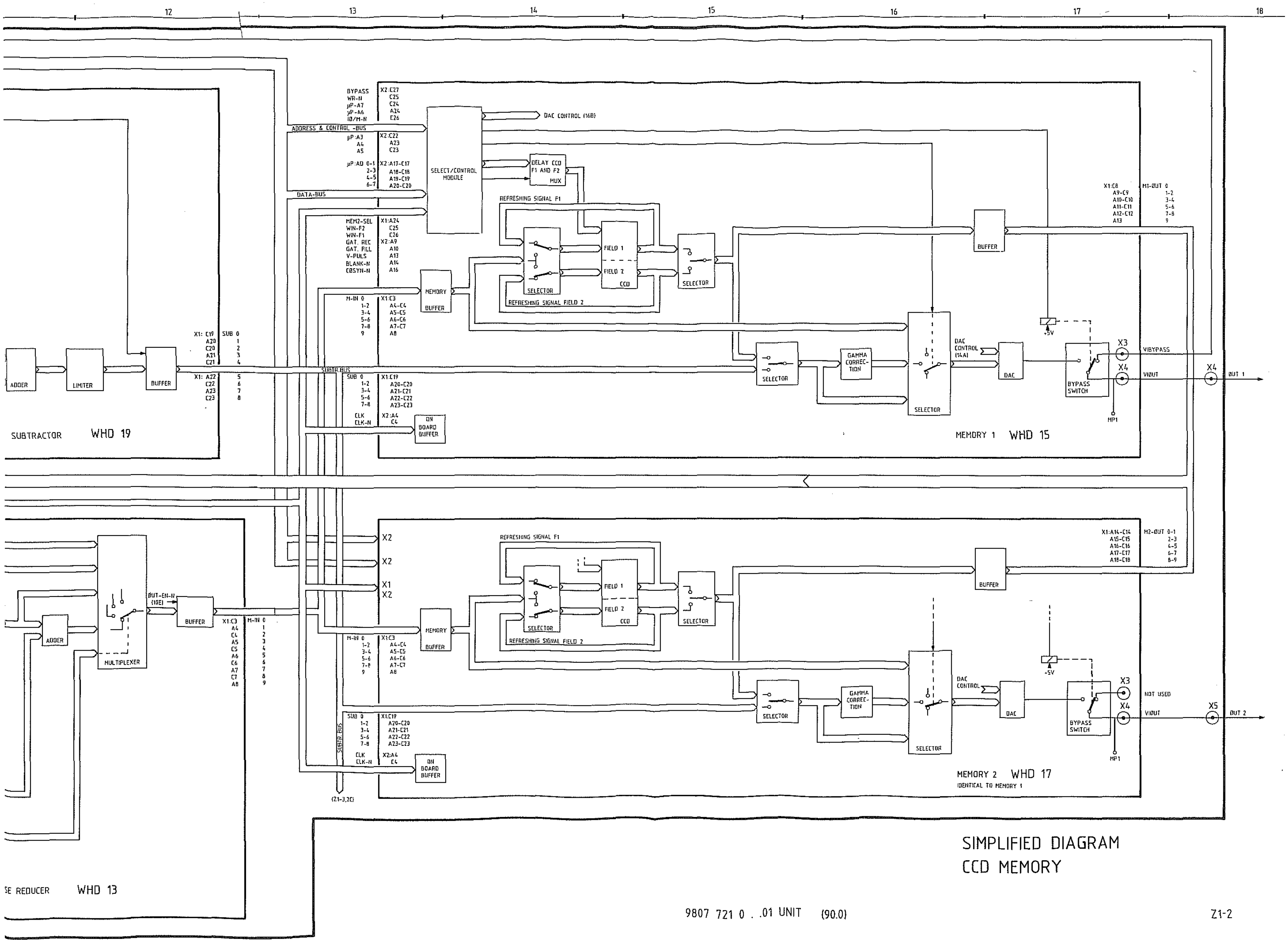




4
5
6
7
8
9
10
CONTROL BUS
I/O BUS
H-PULS
FFT
V-PULS
CLK
CLK--N
CLK/4
CLK/4-N
WFIFO
BUFFER
ON BOARD
POWER DROP RESET
MICRO-PROCESSOR
DATA ADDRES CONTROL
RESET
WATCHDOG TIMER
V-PULS
W1
50Hz
60Hz
DATA-ADDRES-CONTROL BUS
ADDRES LATCH
MEMORY CONTROL LOGIC
TIMERS
CHIP SELECT
PROM 32KX8
RAM 2KX8
ADDRESS-
DATA-CONTROL-BUS
GAT REC
GAT FILL
BLANK-N
RD-N
WR-N
IO/M-N
RESET
BYPASS
50/60Hz
START
MEM-1
MEM-2
LIH
ER
ZOOM
INVERT
TRACE
NR 1
NR 2
NR 3
NR 4
GAMMA 1
GAMMA 2
SUB 1
SUB 2
DISCSTO
DISCFRW
DISCREV
LDSCREV
LDSCFRW
LSPARE 1
LSPARE 2
BUSY
TEXT-N
DISCFULL
IB-N
IDENT 1
IDENT 2
IDENT 3
IDENT 4
IDENT 5
IDENT 6
IDENT 7
IDENT 8
LDISCSPR
LDISCSTO
LDISCFRW
LDISCREV
LDISCZRO
LDISCERA
LSTP/ERA
LNR 2,1
LNR 4,3
LGAMMA 1
LGAMMA 2
LSUB 1
LSUB 2
LSTART
LMEM-1
LMEM-2
LLIH
LER
LSPARE 3
LINVERT
LTRACE
D0-1
D2-3
D4-5
D6-7
RL 0
SL 0
SL 1
SL 2
SL 3
+5V/500E
PP1
PP0
DATA
KEYBOARD/ INTERFACE
X5
X3
AD-OUT
CLK-N
V-PULSE
CDSYN-N
LGAMMA1
LGAMMA2
LSUB1
LSUB2
LINVERT
LSPARE3
LTRACE
RL 1
RL 2
RL 3
RL 4
CONTROLLER CCD WHD 25
I/Ø DECODER
ENABLE
LATCH
SUB1
SUB2
S1
S2
MULTIPLICATOR SELECTOR
M1/M2 (10C)
SM 1
SM 2
MEM 1
MEM 2 LATCH
INVERTER OR NOT -INVERTER
ADDER
MULTIPLIER
IMAGE SELECT
S4.2
S4.1
S3
GREY
ON BOARD BUFFER
MEMORY -BUS
VIDEO-SIGNAL
BUFFER
SELECTOR
MEMORY 1
MEMORY 2
LIVE
VASH
MEM1/MEM2-N (10E)
MEM-N
MEM BUFFER
SUB SIGN
SELECT BLACK/ WHITE IMAGE
FSEL (10E)
TIME SYNCHRONISATION
MOV-K-N PROM
TR-K-N BUFFER
FIX-K-N BUFFER
K-VALUE MULTIP
DATA-BUS
ADDRESS-BUS
CONTROL-BUS
CLK (10E)
K-SELECT
CLK
OUTPUT-SEL
FSEL (10D)
OUT-EN-N (12D)
MEM1/MEM2-N (9D)
MEMORY BUS
µPADDRESS-DATA-CONTROL BUS
BYPASS (1A) 50/60Hz
(Z1-3,2E)
(Z1-3,2D)
(Z1-3,2B)



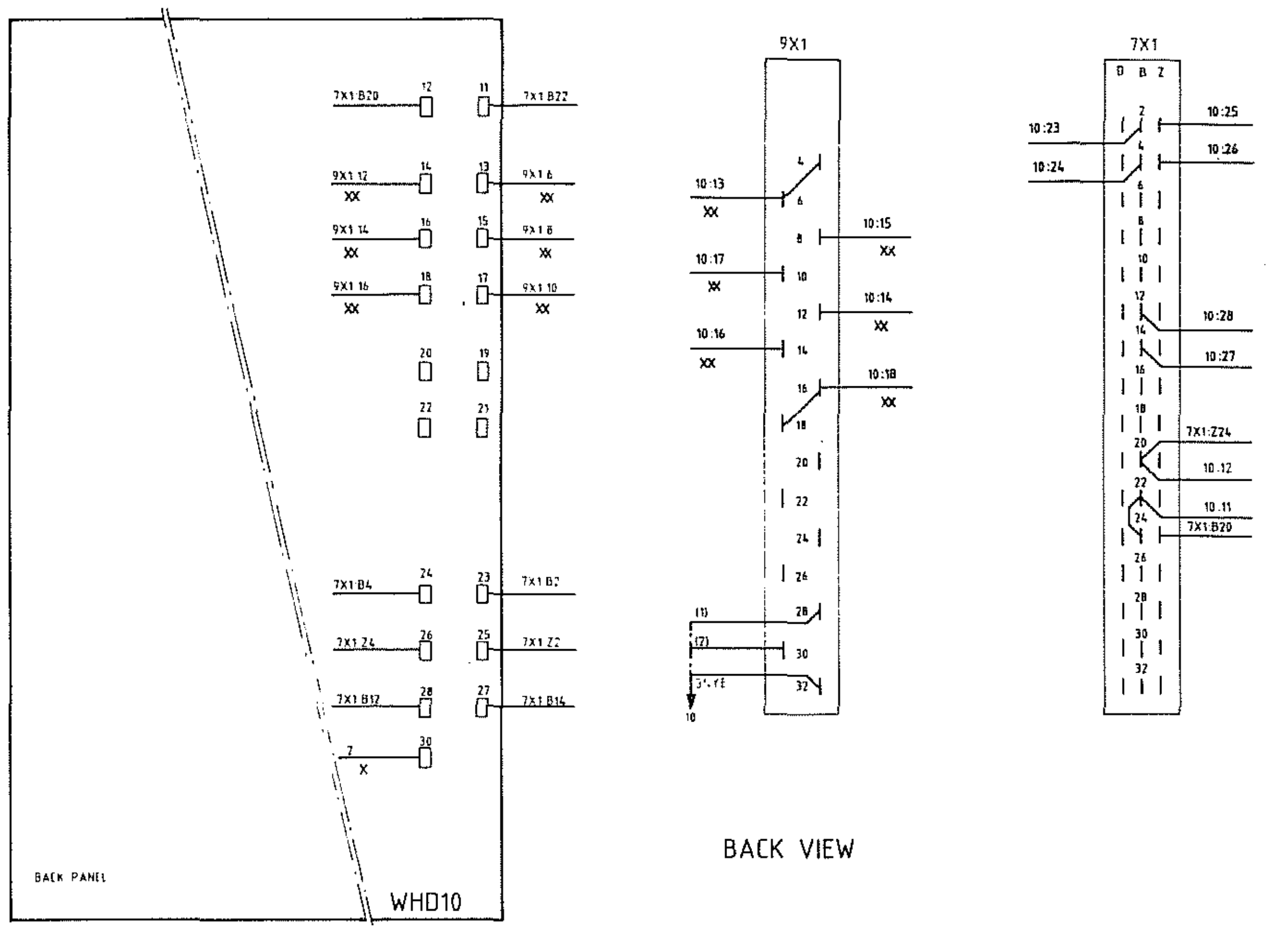
8
9
10
11
12
13
14
GAT REC
GAT FILL
BLANK-N
ADDRESS-
DATA-CONTROL-BUS
RD-N
WR-N
IØ/M-N
RESET
BYPASS
50/60Hz
I/Ø DECODER
ENABLE
LATCH
M1/M2 (10C)
SUB1
SUB2
S1
S2
MULTIPLICATOR SELECTOR
SM 1
SM 2
MD
M1
MEM 1
MEM 2 LATCH
INVERTER OR NOT -INVERTER
ADDER
X4;X2 X1;X1/2
MULTIPLIER
0V
S4.2
S4.1
S3
GREY
IMAGE SELECT
IMAGE SELECT
ADDER
LIMITER
BUFFER
CLK
ON BOARD BUFFER
SUBTRACTOR
WHD 19
SUBTR.BUS
MEMORY -BUS
BYPASS
DAC CONTROL (16B)
ADDRESS & CONTROL -BUS
DATA-BUS
SELECT/CONTROL MODULE
DELAY CCD F1 AND F2 MUX
REFRESHING SIGNAL F1
REFRESHING SIGNAL FIELD 2
FIELD 1
FIELD 2
CCD
SELECTOR
MEMORY BUFFER
MEM2-SEL
WIN-F2
WIN-F1
GAT. REC
GAT. FILL
V-PULS
BLANK-N
COSYN-N
X2
X2
X1
X2
VIDEO-SIGNAL
BUFFER
ADDER
TIME SYNCHRONISATION
K-VALUE MULTIPLIER
ADDER
MULTIPLEXER
ØUT-EN-N (10E)
BUFFER
MOV-K-N PROM
SELECTOR
LIVE
VASH
MEMORY 1
MEMORY 2
MEMORY BUS
MEM-N
MEM BUFFER
MEM1/MEM2-N (10E)
SUB SIGN
SELECT BLACK/ WHITE IMAGE
FSEL (10E)
TR-K-N BUFFER
FIX-K-N BUFFER
CLK (9E)
TIME SYNCHRONISATION
DATA-BUS
ADDRESS-BUS
CONTROL-BUS
SELECTOR
CLK (10E)
K-SELECT
CLK
OUTPUT-SEL
SELECTOR
FSEL (10D)
ØUT-EN-N (12D)
MEM1/MEM2-N (9D)
ON BOARD BUFFER
NOISE REDUCER
WHD 13
CONTROL BUS
µPADDRESS-DATA-CONTROL BUS
(Z1-3,2E)
(Z1-3,2B)
(Z1-3,2D)
(Z1-3,2C)
BYPASS (1A) 50/60Hz



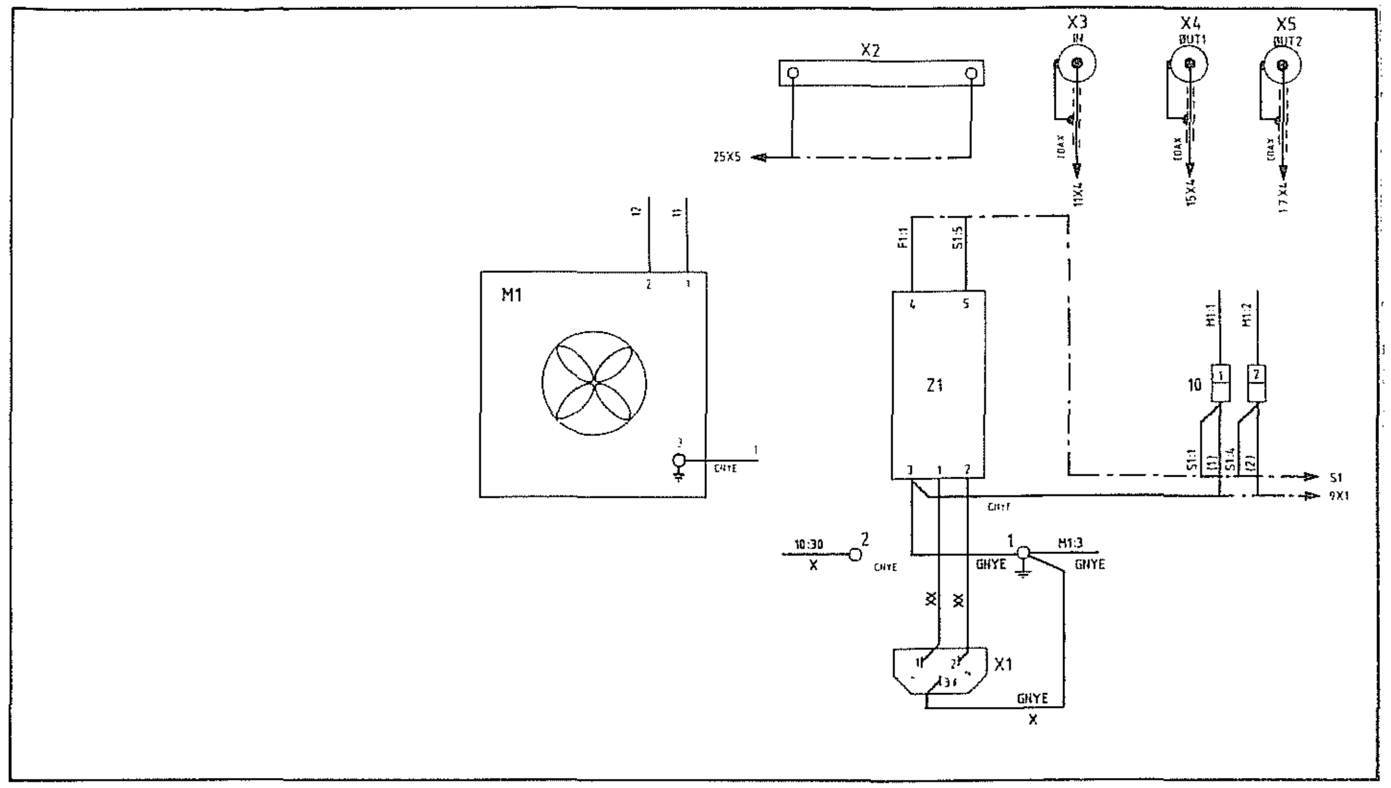
SIMPLIFIED DIAGRAM
CCD MEMORY

Section z

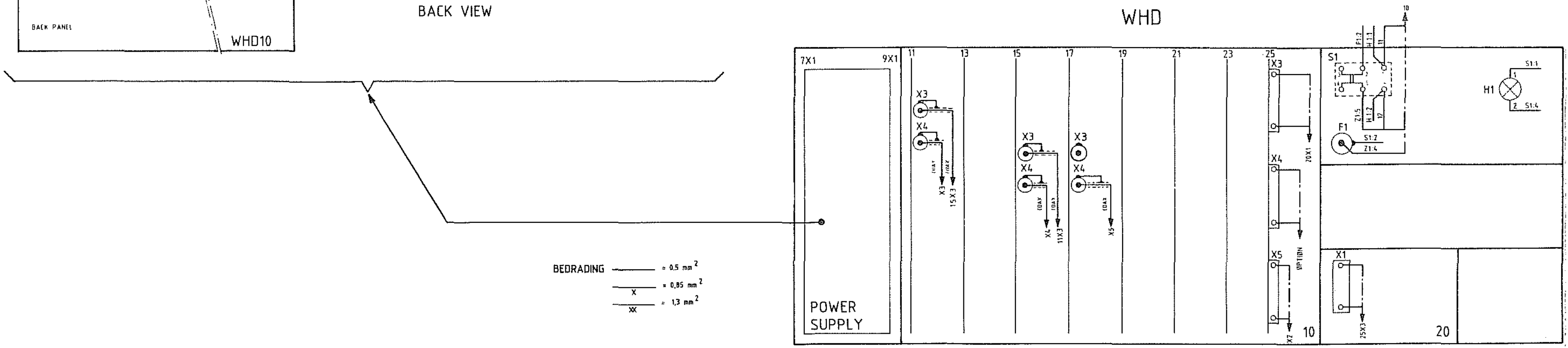
Scopofix MDP



BACK VIEW



WHD

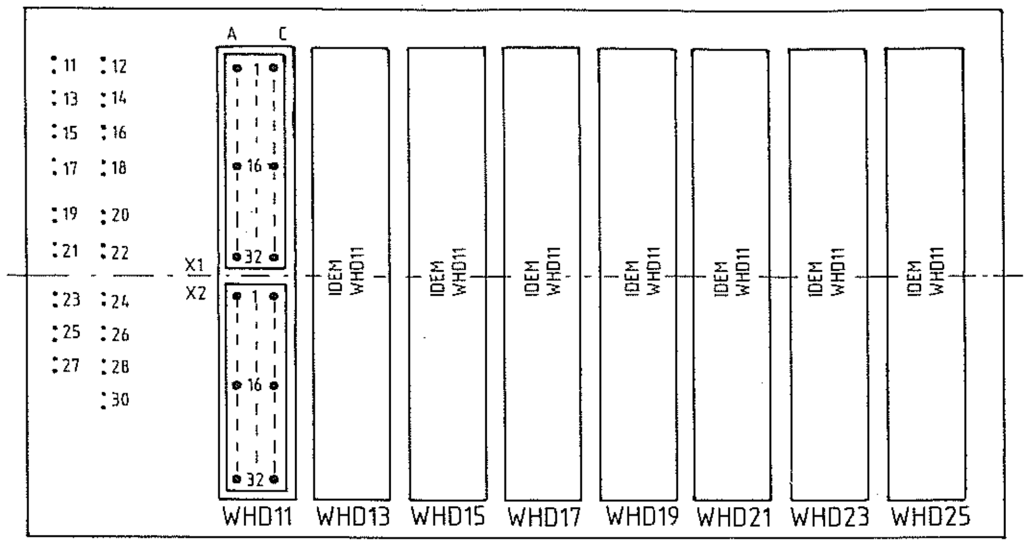


FRONT VIEW

WIRING-RACK+ CONNECTOR LOCATIONS

9807 721 0. .01 (85.0) Z2.1

FRONT VIEW
BACK PANEL



WHD10

SEQUENCE OF CONNECTORPOINTS

WHD10:11	-5V	WHD11X2:A3	+5V		
WHD10:12	0V	WHD11X2:A4	CLK	WHD13X1:C3	M-IN 0
WHD10:13	+5V	WHD11X2:A5	+5V	WHD13X1:C4	M-IN 2
WHD10:14	0V	WHD11X2:A6	SPARE 3	WHD13X1:C5	M-IN 4
WHD10:15	+5V	WHD11X2:A7	0V	WHD13X1:C6	M-IN 6
WHD10:16	0V	WHD11X2:A8	0V	WHD13X1:C7	M-IN 8
WHD10:17	+5V	WHD11X2:C1	0V	WHD13X1:C8	M1-OUT 0
WHD10:18	0V	WHD11X2:C2	SPARE 2	WHD13X1:C9	M1-OUT 2
WHD10:19	+5V	WHD11X2:C3	+5V	WHD13X1:A10	M1-OUT 3
WHD10:20	0V	WHD11X2:C4	CLK-N	WHD13X1:A11	M1-OUT 5
WHD10:21	+12V	WHD11X2:C5	+5V	WHD13X1:A12	M1-OUT 7
WHD10:22	0V	WHD11X2:C6	SPARE 4	WHD13X1:A13	M1-OUT 9
WHD10:23	+12V	WHD11X2:C7	0V	WHD13X1:A14	M2-OUT 0
WHD10:24	0V	WHD11X2:C8	0V	WHD13X1:A15	M2-OUT 2
WHD10:25	+12V	WHD11X2:C9	0V	WHD13X1:A16	M2-OUT 4
WHD10:26	0V	WHD11X2:A11	H PULS	WHD13X1:A17	M2-OUT 6
WHD10:27	-12V	WHD11X2:A12	FFT	WHD13X1:A18	M2-OUT 8
WHD10:28	0V	WHD11X2:A13	V PULS	WHD13X1:A19	0V
WHD10:30	0V	WHD11X2:A15	50HZ	WHD13X1:A20	AD-OUT 1
WHD11X1:A1	0V	WHD11X2:A16	CCSYN-N	WHD13X1:A21	AD-OUT 3
WHD11X1:A2	-5V	WHD11X2:A27	0V	WHD13X1:A22	AD-OUT 5
WHD11X1:A3	SPARE 0	WHD11X2:A28	0V	WHD13X1:A23	AD-OUT 7
WHD11X1:C1	0V	WHD11X2:A29	-12V	WHD13X1:A24	0V
WHD11X1:C2	-5V	WHD11X2:A30	+12V	WHD13X1:A25	0V
WHD11X1:A20	AD-OUT 1	WHD11X2:A31	+5V	WHD13X1:A26	0V
WHD11X1:A21	AD-OUT 3	WHD11X2:A32	0V	WHD13X1:A27	+5V
WHD11X1:A22	AD-OUT 5	WHD11X2:C10	0V	WHD13X1:A28	CLK/4
WHD11X1:A23	AD-OUT 7	WHD11X2:C11	0V	WHD13X1:A29	-12V
WHD11X1:A24	0V	WHD11X2:C12	0V	WHD13X1:A30	+12V
WHD11X1:A25	0V	WHD11X2:C13	0V	WHD13X1:A31	+5V
WHD11X1:A26	0V	WHD11X2:C14	0V	WHD13X1:A32	0V
WHD11X1:A27	+5V	WHD11X2:C15	0V	WHD13X1:C10	M1-OUT 4
WHD11X1:A28	CLK/4	WHD11X2:C16	0V	WHD13X1:C11	M1-OUT 6
WHD11X1:A29	-12V	WHD11X2:C27	BYPASS	WHD13X1:C12	M1-OUT 8
WHD11X1:A30	+12V	WHD11X2:C28	SPARE 5	WHD13X1:C13	0V
WHD11X1:A31	+5V	WHD11X2:C29	-12V	WHD13X1:C14	M2-OUT 1
WHD11X1:A32	0V	WHD11X2:C30	+12V	WHD13X1:C15	M2-OUT 3
WHD11X1:C19	AD-OUT 0	WHD11X2:C31	+5V	WHD13X1:C16	M2-OUT 5
WHD11X1:C20	AD-OUT 2	WHD11X2:C32	0V	WHD13X1:C17	M2-OUT 7
WHD11X1:C21	AD-OUT 4	WHD13X1:A1	0V	WHD13X1:C18	M2-OUT 9
WHD11X1:C22	AD-OUT 6	WHD13X1:A2	-5V	WHD13X1:C19	AD-OUT 0
WHD11X1:C24	SPARE 6	WHD13X1:A3	SPARE 0	WHD13X1:C20	AD-OUT 2
WHD11X1:C27	+5V	WHD13X1:A4	M-IN 1	WHD13X1:C21	AD-OUT 4
WHD11X1:C28	CLK/4-N	WHD13X1:A5	M-IN 3	WHD13X1:C22	AD-OUT 6
WHD11X1:C29	-12V	WHD13X1:A6	M-IN 5	WHD13X1:C24	SPARE 6
WHD11X1:C30	+12V	WHD13X1:A7	M-IN 7	WHD13X1:C27	+5V
WHD11X1:C31	+5V	WHD13X1:A8	M-IN 9	WHD13X1:C28	CLK/4-N
WHD11X1:C32	0V	WHD13X1:A9	M1-OUT 1	WHD13X1:C29	-12V
WHD11X2:A1	0V	WHD13X1:C1	0V	WHD13X1:C30	+12V
WHD11X2:A2	SPARE 1	WHD13X1:C2	-5V	WHD13X1:C31	+5V

WHD13X1:C32	0V	WHD13X2:C21	UP-A1	WHD15X1:A31	+5V
WHD13X2:A1	0V	WHD13X2:C22	UP-A3	WHD15X1:A32	0V
WHD13X2:A2	SPARE 1	WHD13X2:C23	UP-A5	WHD15X1:C10	M1-OUT 4
WHD13X2:A3	+5V	WHD13X2:C24	UP-A7	WHD15X1:C11	M1-OUT 6
WHD13X2:A4	CLK	WHD13X2:C25	WR-N	WHD15X1:C12	M1-OUT 8
WHD13X2:A5	+5V	WHD13X2:C26	IO/M-N	WHD15X1:C13	0V
WHD13X2:A6	SPARE 3	WHD13X2:C27	BYPASS	WHD15X1:C14	M2-OUT 1
WHD13X2:A7	0V	WHD13X2:C28	SPARE 5	WHD15X1:C15	M2-OUT 3
WHD13X2:A8	0V	WHD13X2:C29	-12V	WHD15X1:C16	M2-OUT 5
WHD13X2:C1	0V	WHD13X2:C30	+12V	WHD15X1:C17	M2-OUT 7
WHD13X2:C2	SPARE 2	WHD13X2:C31	+5V	WHD15X1:C18	M2-OUT 9
WHD13X2:C3	+5V	WHD13X2:C32	0V	WHD15X1:C19	SUB 0
WHD13X2:C4	CLK-N	WHD15X1:A1	0V	WHD15X1:C20	SUB 2
WHD13X2:C5	+5V	WHD15X1:A2	-5V	WHD15X1:C21	SUB 4
WHD13X2:C6	SPARE 4	WHD15X1:A3	SPARE 0	WHD15X1:C22	SUB 6
WHD13X2:C7	0V	WHD15X1:A4	M-IN 1	WHD15X1:C23	SUB 8
WHD13X2:C8	0V	WHD15X1:A5	M-IN 3	WHD15X1:C24	SPARE 6
WHD13X2:C9	0V	WHD15X1:A6	M-IN 5	WHD15X1:C25	WIN-F2
WHD13X2:A11	H PULS	WHD15X1:A7	M-IN 7	WHD15X1:C26	WIN-F1
WHD13X2:A12	FFT	WHD15X1:A8	M-IN 9	WHD15X1:C27	+5V
WHD13X2:A13	V PULS	WHD15X1:A9	M1-OUT 1	WHD15X1:C28	CLK/4-N
WHD13X2:A15	50HZ	WHD15X1:C1	0V	WHD15X1:C29	-12V
WHD13X2:A16	CDSYN-N	WHD15X1:C2	-5V	WHD15X1:C30	+12V
WHD13X2:A17	UP-AD 0	WHD15X1:C4	M-IN 2	WHD15X1:C31	+5V
WHD13X2:A18	UP-AD 2	WHD15X1:C5	M-IN 4	WHD15X1:C32	0V
WHD13X2:A19	UP-AD 4	WHD15X1:C6	M-IN 6	WHD15X2:A1	0V
WHD13X2:A20	UP-AD 6	WHD15X1:C7	M-IN 8	WHD15X2:A2	SPARE 1
WHD13X2:A21	UP-A0	WHD15X1:C8	M1-OUT 0	WHD15X2:A3	+5V
WHD13X2:A22	UP-A2	WHD15X1:C9	M1-OUT 2	WHD15X2:A4	CLK
WHD13X2:A23	UP-A4	WHD15X1:A10	M1-OUT 3	WHD15X2:A5	+5V
WHD13X2:A24	UP-A6	WHD15X1:A11	M1-OUT 5	WHD15X2:A6	SPARE 3
WHD13X2:A25	RD-N	WHD15X1:A12	M1-OUT 7	WHD15X2:A7	0V
WHD13X2:A26	RESET	WHD15X1:A13	M1-OUT 9	WHD15X2:A8	0V
WHD13X2:A27	0V	WHD15X1:A14	M2-OUT 0	WHD15X2:A9	GAT.REC
WHD13X2:A28	0V	WHD15X1:A15	M2-OUT 2	WHD15X2:C1	0V
WHD13X2:A29	-12V	WHD15X1:A16	M2-OUT 4	WHD15X2:C2	SPARE 2
WHD13X2:A30	+12V	WHD15X1:A17	M2-OUT 6	WHD15X2:C3	+5V
WHD13X2:A31	+5V	WHD15X1:A18	M2-OUT 8	WHD15X2:C4	CLK-N
WHD13X2:A32	0V	WHD15X1:A19	0V	WHD15X2:C5	+5V
WHD13X2:C10	0V	WHD15X1:A20	SUB 1	WHD15X2:C6	SPARE 4
WHD13X2:C11	0V	WHD15X1:A21	SUB 3	WHD15X2:C7	0V
WHD13X2:C12	0V	WHD15X1:A22	SUB 5	WHD15X2:C8	0V
WHD13X2:C13	0V	WHD15X1:A23	SUB 7	WHD15X2:C9	0V
WHD13X2:C14	0V	WHD15X1:A24	0V	WHD15X2:A10	GAT.FILL
WHD13X2:C15	0V	WHD15X1:A25	0V	WHD15X2:A11	H PULS
WHD13X2:C16	0V	WHD15X1:A26	0V	WHD15X2:A12	FFT
WHD13X2:C17	UP-AD 1	WHD15X1:A27	+5V	WHD15X2:A13	V PULS
WHD13X2:C18	UP-AD 3	WHD15X1:A28	CLK/4	WHD15X2:A14	BLANK-N
WHD13X2:C19	UP-AD 5	WHD15X1:A29	-12V	WHD15X2:A15	50HZ
WHD13X2:C20	UP-AD 7	WHD15X1:A30	+12V	WHD15X2:A16	CCSYN-N

WHD15X2:A17	UP-AD 0	WHD17X1:C3	M-IN 0	WHD17X1:C31	+5V
WHD15X2:A18	UP-AD 2	WHD17X1:C4	M-IN 2	WHD17X1:C32	0V
WHD15X2:A19	UP-AD 4	WHD17X1:C5	M-IN 4	WHD17X2:A1	0V
WHD15X2:A20	UP-AD 6	WHD17X1:C6	M-IN 6	WHD17X2:A2	SPARE 1
WHD15X2:A21	UP-A0	WHD17X1:C7	M-IN 8	WHD17X2:A3	+5V
WHD15X2:A22	UP-A2	WHD17X1:C8	M1-OUT 0	WHD17X2:A4	CLK
WHD15X2:A23	UP-A4	WHD17X1:C9	M1-OUT 2	WHD17X2:A5	+5V
WHD15X2:A24	UP-A6	WHD17X1:A10	M1-OUT 3	WHD17X2:A6	SPARE 3
WHD15X2:A25	RD-N	WHD17X1:A11	M1-OUT 5	WHD17X2:A7	0V
WHD15X2:A26	RESET	WHD17X1:A12	M1-OUT 7	WHD17X2:A8	0V
WHD15X2:A27	0V	WHD17X1:A13	M1-OUT 9	WHD17X2:A9	GAT.REC
WHD15X2:A28	0V	WHD17X1:A14	M2-OUT 0	WHD17X2:C1	0V
WHD15X2:A29	-12V	WHD17X1:A15	M2-OUT 2	WHD17X2:C2	SPARE 2
WHD15X2:A30	+12V	WHD17X1:A16	M2-OUT 4	WHD17X2:C3	+5V
WHD15X2:A31	+5V	WHD17X1:A17	M2-OUT 6	WHD17X2:C4	CLK-N
WHD15X2:A32	0V	WHD17X1:A18	M2-OUT 8	WHD17X2:C5	+5V
WHD15X2:C10	0V	WHD17X1:A19	0V	WHD17X2:C6	SPARE 4
WHD15X2:C11	0V	WHD17X1:A20	SUB 1	WHD17X2:C7	0V
WHD15X2:C12	0V	WHD17X1:A21	SUB 3	WHD17X2:C8	0V
WHD15X2:C13	0V	WHD17X1:A22	SUB 5	WHD17X2:C9	0V
WHD15X2:C14	0V	WHD17X1:A23	SUB 7	WHD17X2:A10	GAT.FILL
WHD15X2:C15	0V	WHD17X1:A25	0V	WHD17X2:A11	H PULS
WHD15X2:C16	0V	WHD17X1:A26	0V	WHD17X2:A12	FFT
WHD15X2:C17	UP-AD 1	WHD17X1:A27	+5V	WHD17X2:A13	V PULS
WHD15X2:C18	UP-AD 3	WHD17X1:A28	CLK/4	WHD17X2:A14	BLANK-N
WHD15X2:C19	UP-AD 5	WHD17X1:A29	-12V	WHD17X2:A15	50HZ
WHD15X2:C20	UP-AD 7	WHD17X1:A30	+12V	WHD17X2:A16	COSYN-N
WHD15X2:C21	UP-A1	WHD17X1:A31	+5V	WHD17X2:A17	UP-AD 0
WHD15X2:C22	UP-A3	WHD17X1:A32	0V	WHD17X2:A18	UP-AD 2
WHD15X2:C23	UP-A5	WHD17X1:C10	M1-OUT 4	WHD17X2:A19	UP-AD 4
WHD15X2:C24	UP-A7	WHD17X1:C11	M1-OUT 6	WHD17X2:A20	UP-AD 6
WHD15X2:C25	WR-N	WHD17X1:C12	M1-OUT 8	WHD17X2:A21	UP-A0
WHD15X2:C26	IO/M-N	WHD17X1:C13	0V	WHD17X2:A22	UP-A2
WHD15X2:C27	BYPASS	WHD17X1:C14	M2-OUT 1	WHD17X2:A23	UP-A4
WHD15X2:C28	SPARE 5	WHD17X1:C15	M2-OUT 3	WHD17X2:A24	UP-A6
WHD15X2:C29	-12V	WHD17X1:C16	M2-OUT 5	WHD17X2:A25	RD-N
WHD15X2:C30	+12V	WHD17X1:C17	M2-OUT 7	WHD17X2:A26	RESET
WHD15X2:C31	+5V	WHD17X1:C18	M2-OUT 9	WHD17X2:A27	0V
WHD15X2:C32	0V	WHD17X1:C19	SUB 0	WHD17X2:A28	0V
WHD17X1:A1	0V	WHD17X1:C20	SUB 2	WHD17X2:A29	-12V
WHD17X1:A2	-5V	WHD17X1:C21	SUB 4	WHD17X2:A30	+12V
WHD17X1:A3	SPARE 0	WHD17X1:C22	SUB 6	WHD17X2:A31	+5V
WHD17X1:A4	M-IN 1	WHD17X1:C23	SUB 8	WHD17X2:A32	0V
WHD17X1:A5	M-IN 3	WHD17X1:C24	SPARE 6	WHD17X2:C10	0V
WHD17X1:A6	M-IN 5	WHD17X1:C25	WIN-F2	WHD17X2:C11	0V
WHD17X1:A7	M-IN 7	WHD17X1:C26	WIN-F1	WHD17X2:C12	0V
WHD17X1:A8	M-IN 9	WHD17X1:C27	+5V	WHD17X2:C13	0V
WHD17X1:A9	M1-OUT 1	WHD17X1:C28	CLK/4-N	WHD17X2:C14	0V
WHD17X1:C1	0V	WHD17X1:C29	-12V	WHD17X2:C15	0V
WHD17X1:C2	-5V	WHD17X1:C30	+12V	WHD17X2:C16	0V

WHD17X2:C17	UP-AD 1	WHD19X1:A26	0V	WHD19X2:A12	FFT
WHD17X2:C18	UP-AD 3	WHD19X1:A27	+5V	WHD19X2:A13	V PULS
WHD17X2:C19	UP-AD 5	WHD19X1:A28	CLK/4	WHD19X2:A14	BLANK-N
WHD17X2:C20	UP-AD 7	WHD19X1:A29	-12V	WHD19X2:A15	50HZ
WHD17X2:C21	UP-A1	WHD19X1:A30	+12V	WHD19X2:A17	UP-AD 0
WHD17X2:C22	UP-A3	WHD19X1:A31	+5V	WHD19X2:A18	UP-AD 2
WHD17X2:C23	UP-A5	WHD19X1:A32	0V	WHD19X2:A19	UP-AD 4
WHD17X2:C24	UP-A7	WHD19X1:C10	M1-OUT 4	WHD19X2:A20	UP-AD 6
WHD17X2:C25	WR-N	WHD19X1:C11	M1-OUT 6	WHD19X2:A21	UP-A0
WHD17X2:C26	IO/M-N	WHD19X1:C12	M1-OUT 8	WHD19X2:A22	UP-A2
WHD17X2:C27	BYPASS	WHD19X1:C13	0V	WHD19X2:A23	UP-A4
WHD17X2:C28	SPARE 5	WHD19X1:C14	M2-OUT 1	WHD19X2:A24	UP-A6
WHD17X2:C29	-12V	WHD19X1:C15	M2-OUT 3	WHD19X2:A25	RD-N
WHD17X2:C30	+12V	WHD19X1:C16	M2-OUT 5	WHD19X2:A26	RESET
WHD17X2:C31	+5V	WHD19X1:C17	M2-OUT 7	WHD19X2:A27	0V
WHD17X2:C32	0V	WHD19X1:C18	M2-OUT 9	WHD19X2:A28	0V
WHD19X1:A1	0V	WHD19X1:C19	SUB 0	WHD19X2:A29	-12V
WHD19X1:A2	-5V	WHD19X1:C20	SUB 2	WHD19X2:A30	+12V
WHD19X1:A3	SPARE 0	WHD19X1:C21	SUB 4	WHD19X2:A31	+5V
WHD19X1:A4	M-IN 1	WHD19X1:C22	SUB 6	WHD19X2:A32	0V
WHD19X1:A5	M-IN 3	WHD19X1:C23	SUB 8	WHD19X2:C10	0V
WHD19X1:A6	M-IN 5	WHD19X1:C24	SPARE 6	WHD19X2:C11	0V
WHD19X1:A7	M-IN 7	WHD19X1:C25	WIN-F2	WHD19X2:C12	0V
WHD19X1:A8	M-IN 9	WHD19X1:C26	WIN-F1	WHD19X2:C13	0V
WHD19X1:A9	M1-OUT 1	WHD19X1:C27	+5V	WHD19X2:C14	0V
WHD19X1:C1	0V	WHD19X1:C28	CLK/4-N	WHD19X2:C15	0V
WHD19X1:C2	-5V	WHD19X1:C29	-12V	WHD19X2:C16	0V
WHD19X1:C3	M-IN 0	WHD19X1:C30	+12V	WHD19X2:C17	UP-AD 1
WHD19X1:C4	M-IN 2	WHD19X1:C31	+5V	WHD19X2:C18	UP-AD 3
WHD19X1:C5	M-IN 4	WHD19X1:C32	0V	WHD19X2:C19	UP-AD 5
WHD19X1:C6	M-IN 6	WHD19X2:A1	0V	WHD19X2:C20	UP-AD 7
WHD19X1:C7	M-IN 8	WHD19X2:A2	SPARE 1	WHD19X2:C21	UP-A1
WHD19X1:C8	M1-OUT 0	WHD19X2:A3	+5V	WHD19X2:C22	UP-A3
WHD19X1:C9	M1-OUT 2	WHD19X2:A4	CLK	WHD19X2:C23	UP-A5
WHD19X1:A10	M1-OUT 3	WHD19X2:A5	+5V	WHD19X2:C24	UP-A7
WHD19X1:A11	M1-OUT 5	WHD19X2:A6	SPARE 3	WHD19X2:C25	WR-N
WHD19X1:A12	M1-OUT 7	WHD19X2:A7	0V	WHD19X2:C26	IO/M-N
WHD19X1:A13	M1-OUT 9	WHD19X2:A8	0V	WHD19X2:C27	BYPASS
WHD19X1:A14	M2-OUT 0	WHD19X2:A9	GAT.REC	WHD19X2:C28	SPARE 5
WHD19X1:A15	M2-OUT 2	WHD19X2:C1	0V	WHD19X2:C29	-12V
WHD19X1:A16	M2-OUT 4	WHD19X2:C2	SPARE 2	WHD19X2:C30	+12V
WHD19X1:A17	M2-OUT 6	WHD19X2:C3	+5V	WHD19X2:C31	+5V
WHD19X1:A18	M2-OUT 8	WHD19X2:C4	CLK-N	WHD19X2:C32	0V
WHD19X1:A19	0V	WHD19X2:C5	+5V	WHD21X1:A1	0V
WHD19X1:A20	SUB 1	WHD19X2:C6	SPARE 4	WHD21X1:A2	-5V
WHD19X1:A21	SUB 3	WHD19X2:C7	0V	WHD21X1:A3	SPARE 0
WHD19X1:A22	SUB 5	WHD19X2:C8	0V	WHD21X1:A4	M-IN 1
WHD19X1:A23	SUB 7	WHD19X2:C9	0V	WHD21X1:A5	M-IN 3
WHD19X1:A24	0V	WHD19X2:A10	GAT.FILL	WHD21X1:A6	M-IN 5
WHD19X1:A25	0V	WHD19X2:A11	H PULS	WHD21X1:A7	M-IN 7

WHD21X1:A8	M-IN 9	WHD21X1:C26	WIN-F1	WHD21X2:C13	0V
WHD21X1:A9	M1-OUT 1	WHD21X1:C27	+5V	WHD21X2:C14	0V
WHD21X1:C1	0V	WHD21X1:C28	CLK/4-N	WHD21X2:C15	0V
WHD21X1:C2	-5V	WHD21X1:C29	-12V	WHD21X2:C16	0V
WHD21X1:C3	M-IN 0	WHD21X1:C30	+12V	WHD21X2:C17	UP-AD 1
WHD21X1:C4	M-IN 2	WHD21X1:C31	+5V	WHD21X2:C18	UP-AD 3
WHD21X1:C5	M-IN 4	WHD21X1:C32	0V	WHD21X2:C19	UP-AD 5
WHD21X1:C6	M-IN 6	WHD21X2:A1	0V	WHD21X2:C20	UP-AD 7
WHD21X1:C7	M-IN 8	WHD21X2:A2	SPARE 1	WHD21X2:C21	UP-A1
WHD21X1:C8	M1-OUT 0	WHD21X2:A3	+5V	WHD21X2:C22	UP-A3
WHD21X1:C9	M1-OUT 2	WHD21X2:A4	CLK	WHD21X2:C23	UP-A5
WHD21X1:A10	M1-OUT 3	WHD21X2:A5	+5V	WHD21X2:C24	UP-A7
WHD21X1:A11	M1-OUT 5	WHD21X2:A6	SPARE 3	WHD21X2:C25	WR-N
WHD21X1:A12	M1-OUT 7	WHD21X2:A7	0V	WHD21X2:C26	IO/M-N
WHD21X1:A13	M1-OUT 9	WHD21X2:A8	0V	WHD21X2:C27	BYPASS
WHD21X1:A14	M2-OUT 0	WHD21X2:A9	GAT.REC	WHD21X2:C28	SPARE 5
WHD21X1:A15	M2-OUT 2	WHD21X2:C1	0V	WHD21X2:C29	-12V
WHD21X1:A16	M2-OUT 4	WHD21X2:C2	SPARE 2	WHD21X2:C30	+12V
WHD21X1:A17	M2-OUT 6	WHD21X2:C3	+5V	WHD21X2:C31	+5V
WHD21X1:A18	M2-OUT 8	WHD21X2:C4	CLK-N	WHD21X2:C32	0V
WHD21X1:A19	0V	WHD21X2:C5	+5V	WHD23X1:A1	0V
WHD21X1:A20	SUB 1	WHD21X2:C6	SPARE 4	WHD23X1:A2	-5V
WHD21X1:A21	SUB 3	WHD21X2:C7	0V	WHD23X1:A3	SPARE 0
WHD21X1:A22	SUB 5	WHD21X2:C8	0V	WHD23X1:A4	M-IN 1
WHD21X1:A23	SUB 7	WHD21X2:C9	0V	WHD23X1:A5	M-IN 3
WHD21X1:A24	0V	WHD21X2:A10	GAT.FILL	WHD23X1:A6	M-IN 5
WHD21X1:A25	0V	WHD21X2:A11	H PULS	WHD23X1:A7	M-IN 7
WHD21X1:A26	0V	WHD21X2:A12	FFT	WHD23X1:A8	M-IN 9
WHD21X1:A27	+5V	WHD21X2:A13	V PULS	WHD23X1:A9	M1-OUT 1
WHD21X1:A28	CLK/4	WHD21X2:A14	BLANK-N	WHD23X1:C1	0V
WHD21X1:A29	-12V	WHD21X2:A15	50HZ	WHD23X1:C2	-5V
WHD21X1:A30	+12V	WHD21X2:A17	UP-AD 0	WHD23X1:C3	M-IN 0
WHD21X1:A31	+5V	WHD21X2:A18	UP-AD 2	WHD23X1:C4	M-IN 2
WHD21X1:A32	0V	WHD21X2:A19	UP-AD 4	WHD23X1:C5	M-IN 4
WHD21X1:C10	M1-OUT 4	WHD21X2:A20	UP-AD 6	WHD23X1:C6	M-IN 6
WHD21X1:C11	M1-OUT 6	WHD21X2:A21	UP-A0	WHD23X1:C7	M-IN 8
WHD21X1:C12	M1-OUT 8	WHD21X2:A22	UP-A2	WHD23X1:C8	M1-OUT 0
WHD21X1:C13	0V	WHD21X2:A23	UP-A4	WHD23X1:C9	M1-OUT 2
WHD21X1:C14	M2-OUT 1	WHD21X2:A24	UP-A6	WHD23X1:A10	M1-OUT 3
WHD21X1:C15	M2-OUT 3	WHD21X2:A25	RD-N	WHD23X1:A11	M1-OUT 5
WHD21X1:C16	M2-OUT 5	WHD21X2:A26	RESET	WHD23X1:A12	M1-OUT 7
WHD21X1:C17	M2-OUT 7	WHD21X2:A27	0V	WHD23X1:A13	M1-OUT 9
WHD21X1:C18	M2-OUT 9	WHD21X2:A28	0V	WHD23X1:A14	M2-OUT 0
WHD21X1:C19	SUB 0	WHD21X2:A29	-12V	WHD23X1:A15	M2-OUT 2
WHD21X1:C20	SUB 2	WHD21X2:A30	+12V	WHD23X1:A16	M2-OUT 4
WHD21X1:C21	SUB 4	WHD21X2:A31	+5V	WHD23X1:A17	M2-OUT 6
WHD21X1:C22	SUB 6	WHD21X2:A32	0V	WHD23X1:A18	M2-OUT 8
WHD21X1:C23	SUB 8	WHD21X2:C10	0V	WHD23X1:A20	SUB 1
WHD21X1:C24	WFIFO-N	WHD21X2:C11	0V	WHD23X1:A21	SUB 3
WHD21X1:C25	WIN-F2	WHD21X2:C12	0V	WHD23X1:A22	SUB 5

	WHD13X2:C21	UP-A1	WHD15X1:A31	+5V
	WHD13X2:C22	UP-A3	WHD15X1:A32	0V
E 1	WHD13X2:C23	UP-A5	WHD15X1:C10	M1-OUT 4
	WHD13X2:C24	UP-A7	WHD15X1:C11	M1-OUT 6
	WHD13X2:C25	WR-N	WHD15X1:C12	M1-OUT 8
	WHD13X2:C26	IO/M-N	WHD15X1:C13	0V
E 3	WHD13X2:C27	BYPASS	WHD15X1:C14	M2-OUT 1
	WHD13X2:C28	SPARE 5	WHD15X1:C15	M2-OUT 3
	WHD13X2:C29	-12V	WHD15X1:C16	M2-OUT 5
	WHD13X2:C30	+12V	WHD15X1:C17	M2-OUT 7
E 2	WHD13X2:C31	+5V	WHD15X1:C18	M2-OUT 9
	WHD13X2:C32	0V	WHD15X1:C19	SUB 0
H	WHD15X1:A1	0V	WHD15X1:C20	SUB 2
	WHD15X1:A2	-5V	WHD15X1:C21	SUB 4
E 4	WHD15X1:A3	SPARE 0	WHD15X1:C22	SUB 6
	WHD15X1:A4	M-IN 1	WHD15X1:C23	SUB 8
	WHD15X1:A5	M-IN 3	WHD15X1:C24	SPARE 6
	WHD15X1:A6	M-IN 5	WHD15X1:C25	WIN-F2
L5	WHD15X1:A7	M-IN 7	WHD15X1:C26	WIN-F1
	WHD15X1:A8	M-IN 9	WHD15X1:C27	+5V
LS	WHD15X1:A9	M1-OUT 1	WHD15X1:C28	CLK/4-N
	WHD15X1:C1	0V	WHD15X1:C29	-12V
N-N	WHD15X1:C2	-5V	WHD15X1:C30	+12V
D 0	WHD15X1:C4	M-IN 2	WHD15X1:C31	+5V
D 2	WHD15X1:C5	M-IN 4	WHD15X1:C32	0V
D 4	WHD15X1:C6	M-IN 6	WHD15X2:A1	0V
D 6	WHD15X1:C7	M-IN 8	WHD15X2:A2	SPARE 1
0	WHD15X1:C8	M1-OUT 0	WHD15X2:A3	+5V
2	WHD15X1:C9	M1-OUT 2	WHD15X2:A4	CLK
4	WHD15X1:A10	M1-OUT 3	WHD15X2:A5	+5V
6	WHD15X1:A11	M1-OUT 5	WHD15X2:A6	SPARE 3
	WHD15X1:A12	M1-OUT 7	WHD15X2:A7	0V
T	WHD15X1:A13	M1-OUT 9	WHD15X2:A8	0V
	WHD15X1:A14	M2-OUT 0	WHD15X2:A9	GAT.REC
	WHD15X1:A15	M2-OUT 2	WHD15X2:C1	0V
	WHD15X1:A16	M2-OUT 4	WHD15X2:C2	SPARE 2
	WHD15X1:A17	M2-OUT 6	WHD15X2:C3	+5V
	WHD15X1:A18	M2-OUT 8	WHD15X2:C4	CLK-N
	WHD15X1:A19	0V	WHD15X2:C5	+5V
	WHD15X1:A20	SUB 1	WHD15X2:C6	SPARE 4
	WHD15X1:A21	SUB 3	WHD15X2:C7	0V
	WHD15X1:A22	SUB 5	WHD15X2:C8	0V
	WHD15X1:A23	SUB 7	WHD15X2:C9	0V
	WHD15X1:A24	0V	WHD15X2:A10	GAT.FILL
	WHD15X1:A25	0V	WHD15X2:A11	H PULS
	WHD15X1:A26	0V	WHD15X2:A12	FFT
D 1	WHD15X1:A27	+5V	WHD15X2:A13	V PULS
D 3	WHD15X1:A28	CLK/4	WHD15X2:A14	BLANK-N
D 5	WHD15X1:A29	-12V	WHD15X2:A15	50HZ
D 7	WHD15X1:A33	+12V	WHD15X2:A16	COSYN-N

WHD17X2:C17	UP-AD 1	WHD19X1:A26	0V	WHD19X2:A12	FFT
WHD17X2:C18	UP-AD 3	WHD19X1:A27	+5V	WHD19X2:A13	V PULS
WHD17X2:C19	UP-AD 5	WHD19X1:A28	CLK/4	WHD19X2:A14	BLANK-N
WHD17X2:C20	UP-AD 7	WHD19X1:A29	-12V	WHD19X2:A15	50HZ
WHD17X2:C21	UP-A1	WHD19X1:A30	+12V	WHD19X2:A17	UP-AD 0
WHD17X2:C22	UP-A3	WHD19X1:A31	+5V	WHD19X2:A18	UP-AD 2
WHD17X2:C23	UP-A5	WHD19X1:A32	0V	WHD19X2:A19	UP-AD 4
WHD17X2:C24	UP-A7	WHD19X1:C10	M1-OUT 4	WHD19X2:A20	UP-AD 6
WHD17X2:C25	WR-N	WHD19X1:C11	M1-OUT 6	WHD19X2:A21	UP-AD
WHD17X2:C26	IO/M-N	WHD19X1:C12	M1-OUT 8	WHD19X2:A22	UP-A2
WHD17X2:C27	BYPASS	WHD19X1:C13	0V	WHD19X2:A23	UP-A4
WHD17X2:C28	SPARE 5	WHD19X1:C14	M2-OUT 1	WHD19X2:A24	UP-A6
WHD17X2:C29	-12V	WHD19X1:C15	M2-OUT 3	WHD19X2:A25	RD-N
WHD17X2:C30	+12V	WHD19X1:C16	M2-OUT 5	WHD19X2:A26	RESET
WHD17X2:C31	+5V	WHD19X1:C17	M2-OUT 7	WHD19X2:A27	0V
WHD17X2:C32	0V	WHD19X1:C18	M2-OUT 9	WHD19X2:A28	0V
WHD19X1:A1	0V	WHD19X1:C19	SUB 0	WHD19X2:A29	-12V
WHD19X1:A2	-5V	WHD19X1:C20	SUB 2	WHD19X2:A30	+12V
WHD19X1:A3	SPARE 0	WHD19X1:C21	SUB 4	WHD19X2:A31	+5V
WHD19X1:A4	M-IN 1	WHD19X1:C22	SUB 6	WHD19X2:A32	0V
WHD19X1:A5	M-IN 3	WHD19X1:C23	SUB 8	WHD19X2:C10	0V
WHD19X1:A6	M-IN 5	WHD19X1:C24	SPARE 6	WHD19X2:C11	0V
WHD19X1:A7	M-IN 7	WHD19X1:C25	WIN-F2	WHD19X2:C12	0V
WHD19X1:A8	M-IN 9	WHD19X1:C26	WIN-F1	WHD19X2:C13	0V
WHD19X1:A9	M1-OUT 1	WHD19X1:C27	+5V	WHD19X2:C14	0V
WHD19X1:C1	0V	WHD19X1:C28	CLK/4-N	WHD19X2:C15	0V
WHD19X1:C2	-5V	WHD19X1:C29	-12V	WHD19X2:C16	0V
WHD19X1:C3	M-IN 0	WHD19X1:C30	+12V	WHD19X2:C17	UP-AD 1
WHD19X1:C4	M-IN 2	WHD19X1:C31	+5V	WHD19X2:C18	UP-AD 3
WHD19X1:C5	M-IN 4	WHD19X1:C32	0V	WHD19X2:C19	UP-AD 5
WHD19X1:C6	M-IN 6	WHD19X2:A1	0V	WHD19X2:C20	UP-AD 7
WHD19X1:C7	M-IN 8	WHD19X2:A2	SPARE 1	WHD19X2:C21	UP-A1
WHD19X1:C8	M1-OUT 0	WHD19X2:A3	+5V	WHD19X2:C22	UP-A3
WHD19X1:C9	M1-OUT 2	WHD19X2:A4	CLK	WHD19X2:C23	UP-A5
WHD19X1:A10	M1-OUT 3	WHD19X2:A5	+5V	WHD19X2:C24	UP-A7
WHD19X1:A11	M1-OUT 5	WHD19X2:A6	SPARE 3	WHD19X2:C25	WR-N
WHD19X1:A12	M1-OUT 7	WHD19X2:A7	0V	WHD19X2:C26	IO/M-N
WHD19X1:A13	M1-OUT 9	WHD19X2:A8	0V	WHD19X2:C27	BYPASS
WHD19X1:A14	M2-OUT 0	WHD19X2:A9	GAT.REC	WHD19X2:C28	SPARE 5
WHD19X1:A15	M2-OUT 2	WHD19X2:C1	0V	WHD19X2:C29	-12V
WHD19X1:A16	M2-OUT 4	WHD19X2:C2	SPARE 2	WHD19X2:C30	+12V
WHD19X1:A17	M2-OUT 6	WHD19X2:C3	+5V	WHD19X2:C31	+5V
WHD19X1:A18	M2-OUT 8	WHD19X2:C4	CLK-N	WHD19X2:C32	0V
WHD19X1:A19	0V	WHD19X2:C5	+5V	WHD21X1:A1	0V
WHD19X1:A20	SUB 1	WHD19X2:C6	SPARE 4	WHD21X1:A2	-5V
WHD19X1:A21	SUB 3	WHD19X2:C7	0V	WHD21X1:A3	SPARE 0
WHD19X1:A22	SUB 5	WHD19X2:C8	0V	WHD21X1:A4	M-IN 1
WHD19X1:A23	SUB 7	WHD19X2:C9	0V	WHD21X1:A5	M-IN 3
WHD19X1:A24	0V	WHD19X2:A10	GAT.FILL	WHD21X1:A6	M-IN 5
WHD19X1:A25	0V	WHD19X2:A11	H PULS	WHD21X1:A7	M-IN 7

WHD23X1:A23	SUB 7	WHD23X2:A10	GAT.FILL	WHD25X1:A24	0V
WHD23X1:A24	0V	WHD23X2:A11	H PULS	WHD25X1:A25	0V
WHD23X1:A25	0V	WHD23X2:A12	FFT	WHD25X1:A26	0V
WHD23X1:A26	0V	WHD23X2:A13	V PULS	WHD25X1:A27	+5V
WHD23X1:A27	+5V	WHD23X2:A14	BLANK-N	WHD25X1:A28	CLK/4
WHD23X1:A28	CLK/4	WHD23X2:A15	50HZ	WHD25X1:A29	-12V
WHD23X1:A29	-12V	WHD23X2:A17	UP-AD 0	WHD25X1:A30	+12V
WHD23X1:A30	+12V	WHD23X2:A18	UP-AD 2	WHD25X1:A31	+5V
WHD23X1:A31	+5V	WHD23X2:A19	UP-AD 4	WHD25X1:A32	0V
WHD23X1:A32	0V	WHD23X2:A20	UP-AD 6	WHD25X1:C24	WFIFO-N
WHD23X1:C10	M1-OUT 4	WHD23X2:A21	UP-AD	WHD25X1:C25	WIN-F2
WHD23X1:C11	M1-OUT 6	WHD23X2:A22	UP-A2	WHD25X1:C26	WIN-F1
WHD23X1:C12	M1-OUT 8	WHD23X2:A23	UP-A4	WHD25X1:C27	+5V
WHD23X1:C14	M2-OUT 1	WHD23X2:A24	UP-A6	WHD25X1:C28	CLK/4-N
WHD23X1:C15	M2-OUT 3	WHD23X2:A25	RD-N	WHD25X1:C29	-12V
WHD23X1:C16	M2-OUT 5	WHD23X2:A26	RESET	WHD25X1:C30	+12V
WHD23X1:C17	M2-OUT 7	WHD23X2:A27	0V	WHD25X1:C31	+5V
WHD23X1:C18	M2-OUT 9	WHD23X2:A28	0V	WHD25X1:C32	0V
WHD23X1:C19	SUB 0	WHD23X2:A29	-12V	WHD25X2:A1	0V
WHD23X1:C20	SUB 2	WHD23X2:A30	+12V	WHD25X2:A2	SPARE 1
WHD23X1:C21	SUB 4	WHD23X2:A31	+5V	WHD25X2:A3	+5V
WHD23X1:C22	SUB 6	WHD23X2:A32	0V	WHD25X2:A4	CLK
WHD23X1:C23	SUB 8	WHD23X2:C10	0V	WHD25X2:A5	+5V
WHD23X1:C24	WFIFO-N	WHD23X2:C11	0V	WHD25X2:A6	SPARE 3
WHD23X1:C25	WIN-F2	WHD23X2:C12	0V	WHD25X2:A7	0V
WHD23X1:C26	WIN-F1	WHD23X2:C13	0V	WHD25X2:A8	0V
WHD23X1:C27	+5V	WHD23X2:C14	0V	WHD25X2:A9	GAT.REC
WHD23X1:C28	CLK/4-N	WHD23X2:C15	0V	WHD25X2:C1	0V
WHD23X1:C29	-12V	WHD23X2:C16	0V	WHD25X2:C2	SPARE 2
WHD23X1:C30	+12V	WHD23X2:C17	UP-AD 1	WHD25X2:C3	+5V
WHD23X1:C31	+5V	WHD23X2:C18	UP-AD 3	WHD25X2:C4	CLK-N
WHD23X1:C32	0V	WHD23X2:C19	UP-AD 5	WHD25X2:C5	+5V
WHD23X2:A1	0V	WHD23X2:C20	UP-AD 7	WHD25X2:C6	SPARE 4
WHD23X2:A2	SPARE 1	WHD23X2:C21	UP-A1	WHD25X2:C7	0V
WHD23X2:A3	+5V	WHD23X2:C22	UP-A3	WHD25X2:C8	0V
WHD23X2:A4	CLK	WHD23X2:C23	UP-A5	WHD25X2:C9	0V
WHD23X2:A5	+5V	WHD23X2:C24	UP-A7	WHD25X2:A10	GAT.FILL
WHD23X2:A6	SPARE 3	WHD23X2:C25	WR-N	WHD25X2:A11	H PULS
WHD23X2:A7	0V	WHD23X2:C26	IO/M-N	WHD25X2:A12	FFT
WHD23X2:A8	0V	WHD23X2:C27	BYPASS	WHD25X2:A13	V PULS
WHD23X2:A9	GAT.REC	WHD23X2:C28	SPARE 5	WHD25X2:A14	BLANK-N
WHD23X2:C1	0V	WHD23X2:C29	-12V	WHD25X2:A15	50HZ
WHD23X2:C2	SPARE 2	WHD23X2:C30	+12V	WHD25X2:A17	UP-AD 0
WHD23X2:C3	+5V	WHD23X2:C31	+5V	WHD25X2:A18	UP-AD 2
WHD23X2:C4	CLK-N	WHD23X2:C32	0V	WHD25X2:A19	UP-AD 4
WHD23X2:C5	+5V	WHD25X1:A1	0V	WHD25X2:A20	UP-AD 6
WHD23X2:C6	SPARE 4	WHD25X1:A2	-5V	WHD25X2:A21	UP-AD
WHD23X2:C7	0V	WHD25X1:A3	SPARE 0	WHD25X2:A22	UP-A2
WHD23X2:C8	0V	WHD25X1:C1	0V	WHD25X2:A23	UP-A4
WHD23X2:C9	0V	WHD25X1:C2	-5V	WHD25X2:A24	UP-A6

D 0	WHD17X1:C3	M-IN 0	WHD17X1:C31	+5V
D 2	WHD17X1:C4	M-IN 2	WHD17X1:C32	0V
D 4	WHD17X1:C5	M-IN 4	WHD17X2:A1	0V
D 6	WHD17X1:C6	M-IN 6	WHD17X2:A2	SPARE 1
0	WHD17X1:C7	M-IN 8	WHD17X2:A3	+5V
2	WHD17X1:C8	M1-OUT 0	WHD17X2:A4	CLK
4	WHD17X1:C9	M1-OUT 2	WHD17X2:A5	+5V
6	WHD17X1:A10	M1-OUT 3	WHD17X2:A6	SPARE 3
	WHD17X1:A11	M1-OUT 5	WHD17X2:A7	0V
T	WHD17X1:A12	M1-OUT 7	WHD17X2:A8	0V
	WHD17X1:A13	M1-OUT 9	WHD17X2:A9	GAT.REC
	WHD17X1:A14	M2-OUT 0	WHD17X2:C1	0V
	WHD17X1:A15	M2-OUT 2	WHD17X2:C2	SPARE 2
	WHD17X1:A16	M2-OUT 4	WHD17X2:C3	+5V
	WHD17X1:A17	M2-OUT 6	WHD17X2:C4	CLK-N
	WHD17X1:A18	M2-OUT 8	WHD17X2:C5	+5V
	WHD17X1:A19	0V	WHD17X2:C6	SPARE 4
	WHD17X1:A20	SUB 1	WHD17X2:C7	0V
	WHD17X1:A21	SUB 3	WHD17X2:C8	0V
	WHD17X1:A22	SUB 5	WHD17X2:C9	0V
	WHD17X1:A23	SUB 7	WHD17X2:A10	GAT.FILL
	WHD17X1:A25	0V	WHD17X2:A11	H PULS
	WHD17X1:A26	0V	WHD17X2:A12	FFT
D 1	WHD17X1:A27	+5V	WHD17X2:A13	V PULS
D 3	WHD17X1:A28	CLK/4	WHD17X2:A14	BLANK-N
D 5	WHD17X1:A29	-12V	WHD17X2:A15	50HZ
D 7	WHD17X1:A30	+12V	WHD17X2:A16	COSYN-N
1	WHD17X1:A31	+5V	WHD17X2:A17	UP-AD 0
3	WHD17X1:A32	0V	WHD17X2:A18	UP-AD 2
5	WHD17X1:C10	M1-OUT 4	WHD17X2:A19	UP-AD 4
7	WHD17X1:C11	M1-OUT 6	WHD17X2:A20	UP-AD 6
	WHD17X1:C12	M1-OUT 8	WHD17X2:A21	UP-AD
-N	WHD17X1:C13	0V	WHD17X2:A22	UP-A2
SS	WHD17X1:C14	M2-OUT 1	WHD17X2:A23	UP-A4
E 5	WHD17X1:C15	M2-OUT 3	WHD17X2:A24	UP-A6
	WHD17X1:C16	M2-OUT 5	WHD17X2:A25	RD-N
	WHD17X1:C17	M2-OUT 7	WHD17X2:A26	RESET
	WHD17X1:C18	M2-OUT 9	WHD17X2:A27	0V
	WHD17X1:C19	SUB 0	WHD17X2:A28	0V
	WHD17X1:C20	SUB 2	WHD17X2:A29	-12V
	WHD17X1:C21	SUB 4	WHD17X2:A30	+12V
E 0	WHD17X1:C22	SUB 6	WHD17X2:A31	+5V
1	WHD17X1:C23	SUB 8	WHD17X2:A32	0V
3	WHD17X1:C24	SPARE 6	WHD17X2:C10	0V
5	WHD17X1:C25	WIN-F2	WHD17X2:C11	0V
7	WHD17X1:C26	WIN-F1	WHD17X2:C12	0V
9	WHD17X1:C27	+5V	WHD17X2:C13	0V
JT 1	WHD17X1:C28	CLK/4-N	WHD17X2:C14	0V
	WHD17X1:C29	-12V	WHD17X2:C15	0V
	WHD17X1:C30	+12V	WHD17X2:C16	0V

WHD21X1:A8	M-IN 9	WHD21X1:C26	WIN-F1	WHD21X2:C13	0V
WHD21X1:A9	M1-OUT 1	WHD21X1:C27	+5V	WHD21X2:C14	0V
WHD21X1:C1	0V	WHD21X1:C28	CLK/4-N	WHD21X2:C15	0V
WHD21X1:C2	-5V	WHD21X1:C29	-12V	WHD21X2:C16	0V
WHD21X1:C3	M-IN 0	WHD21X1:C30	+12V	WHD21X2:C17	UP-AD 1
WHD21X1:C4	M-IN 2	WHD21X1:C31	+5V	WHD21X2:C18	UP-AD 3
WHD21X1:C5	M-IN 4	WHD21X1:C32	0V	WHD21X2:C19	UP-AD 5
WHD21X1:C6	M-IN 6	WHD21X2:A1	0V	WHD21X2:C20	UP-AD 7
WHD21X1:C7	M-IN 8	WHD21X2:A2	SPARE 1	WHD21X2:C21	UP-A1
WHD21X1:C8	M1-OUT 0	WHD21X2:A3	+5V	WHD21X2:C22	UP-A3
WHD21X1:C9	M1-OUT 2	WHD21X2:A4	CLK	WHD21X2:C23	UP-A5
WHD21X1:A10	M1-OUT 3	WHD21X2:A5	+5V	WHD21X2:C24	UP-A7
WHD21X1:A11	M1-OUT 5	WHD21X2:A6	SPARE 3	WHD21X2:C25	WR-N
WHD21X1:A12	M1-OUT 7	WHD21X2:A7	0V	WHD21X2:C26	IO/M-N
WHD21X1:A13	M1-OUT 9	WHD21X2:A8	0V	WHD21X2:C27	BYPASS
WHD21X1:A14	M2-OUT 0	WHD21X2:A9	GAT.REC	WHD21X2:C28	SPARE 5
WHD21X1:A15	M2-OUT 2	WHD21X2:C1	0V	WHD21X2:C29	-12V
WHD21X1:A16	M2-OUT 4	WHD21X2:C2	SPARE 2	WHD21X2:C30	+12V
WHD21X1:A17	M2-OUT 6	WHD21X2:C3	+5V	WHD21X2:C31	+5V
WHD21X1:A18	M2-OUT 8	WHD21X2:C4	CLK-N	WHD21X2:C32	0V
WHD21X1:A19	0V	WHD21X2:C5	+5V	WHD23X1:A1	0V
WHD21X1:A20	SUB 1	WHD21X2:C6	SPARE 4	WHD23X1:A2	-5V
WHD21X1:A21	SUB 3	WHD21X2:C7	0V	WHD23X1:A3	SPARE 0
WHD21X1:A22	SUB 5	WHD21X2:C8	0V	WHD23X1:A4	M-IN 1
WHD21X1:A23	SUB 7	WHD21X2:C9	0V	WHD23X1:A5	M-IN 3
WHD21X1:A24	0V	WHD21X2:A10	GAT.FILL	WHD23X1:A6	M-IN 5
WHD21X1:A25	0V	WHD21X2:A11	H PULS	WHD23X1:A7	M-IN 7
WHD21X1:A26	0V	WHD21X2:A12	FFT	WHD23X1:A8	M-IN 9
WHD21X1:A27	+5V	WHD21X2:A13	V PULS	WHD23X1:A9	M1-OUT 1
WHD21X1:A28	CLK/4	WHD21X2:A14	BLANK-N	WHD23X1:C1	0V
WHD21X1:A29	-12V	WHD21X2:A15	50HZ	WHD23X1:C2	-5V
WHD21X1:A30	+12V	WHD21X2:A17	UP-AD 0	WHD23X1:C3	M-IN 0
WHD21X1:A31	+5V	WHD21X2:A18	UP-AD 2	WHD23X1:C4	M-IN 2
WHD21X1:A32	0V	WHD21X2:A19	UP-AD 4	WHD23X1:C5	M-IN 4
WHD21X1:C10	M1-OUT 4	WHD21X2:A20	UP-AD 6	WHD23X1:C6	M-IN 6
WHD21X1:C11	M1-OUT 6	WHD21X2:A21	UP-AD	WHD23X1:C7	M-IN 8
WHD21X1:C12	M1-OUT 8	WHD21X2:A22	UP-A2	WHD23X1:C8	M1-OUT 0
WHD21X1:C13	0V	WHD21X2:A23	UP-A4	WHD23X1:C9	M1-OUT 2
WHD21X1:C14	M2-OUT 1	WHD21X2:A24	UP-A6	WHD23X1:A10	M1-OUT 3
WHD21X1:C15	M2-OUT 3	WHD21X2:A25	RD-N	WHD23X1:A11	M1-OUT 5
WHD21X1:C16	M2-OUT 5	WHD21X2:A26	RESET	WHD23X1:A12	M1-OUT 7
WHD21X1:C17	M2-OUT 7	WHD21X2:A27	0V	WHD23X1:A13	M1-OUT 9
WHD21X1:C18	M2-OUT 9	WHD21X2:A28	0V	WHD23X1:A14	M2-OUT 0
WHD21X1:C19	SUB 0	WHD21X2:A29	-12V	WHD23X1:A15	M2-OUT 2
WHD21X1:C20	SUB 2	WHD21X2:A30	+12V	WHD23X1:A16	M2-OUT 4
WHD21X1:C21	SUB 4	WHD21X2:A31	+5V	WHD23X1:A17	M2-OUT 6
WHD21X1:C22	SUB 6	WHD21X2:A32	0V	WHD23X1:A18	M2-OUT 8
WHD21X1:C23	SUB 8	WHD21X2:C10	0V	WHD23X1:A20	SUB 1
WHD21X1:C24	WFIFO-N	WHD21X2:C11	0V	WHD23X1:A21	SUB 3
WHD21X1:C25	WIN-F2	WHD21X2:C12	0V	WHD23X1:A22	SUB 5

WHD25X2:A25	RD-N
WHD25X2:A26	RESET
WHD25X2:A27	0V
WHD25X2:A28	0V
WHD25X2:A29	-12V
WHD25X2:A30	+12V
WHD25X2:A31	+5V
WHD25X2:A32	0V
WHD25X2:C10	0V
WHD25X2:C11	0V
WHD25X2:C12	0V
WHD25X2:C13	0V
WHD25X2:C14	0V
WHD25X2:C15	0V
WHD25X2:C16	0V
WHD25X2:C17	UP-AD 1
WHD25X2:C18	UP-AD 3
WHD25X2:C19	UP-AD 5
WHD25X2:C20	UP-AD 7
WHD25X2:C21	UP-A1
WHD25X2:C22	UP-A3
WHD25X2:C23	UP-A5
WHD25X2:C24	UP-A7
WHD25X2:C25	WR-N
WHD25X2:C26	IO/M-N
WHD25X2:C27	BYPASS
WHD25X2:C28	SPARE 5
WHD25X2:C29	-12V
WHD25X2:C30	+12V
WHD25X2:C31	+5V
WHD25X2:C32	0V

SEQUENCE OF MNEMONICS

0V	WHD10:12 - WHD10:14 - WHD10:16 - WHD10:18 -
	- WHD10:20 - WHD10:22 - WHD10:24 - WHD10:26 -
	- WHD10:28 - WHD10:29 - WHD11X1:A1 - WHD13X1:A1 -
	- WHD15X1:A1 - WHD17X1:A1 - WHD19X1:A1 - WHD21X1:A1 -
	- WHD23X1:A1 - WHD11X1:C1 - WHD13X1:C1 - WHD15X1:C1 -
	- WHD17X1:C1 - WHD19X1:C1 - WHD21X1:C1 - WHD23X1:C1 -
	- WHD13X1:C13 - WHD15X1:C13 - WHD17X1:C13 - WHD19X1:C13 -
	- WHD21X1:C13 - WHD13X1:A19 - WHD15X1:A19 - WHD17X1:A19 -
	- WHD19X1:A19 - WHD21X1:A19 - WHD11X1:A24 - WHD13X1:A24 -
	- WHD15X1:A24 - WHD19X1:A24 - WHD21X1:A24 - WHD23X1:A24 -
	- WHD11X1:A25 - WHD13X1:A25 - WHD15X1:A25 - WHD17X1:A25 -
	- WHD19X1:A25 - WHD21X1:A25 - WHD23X1:A25 - WHD11X1:A26 -
	- WHD13X1:A26 - WHD15X1:A26 - WHD17X1:A26 - WHD19X1:A26 -
	- WHD21X1:A26 - WHD23X1:A26 - WHD11X1:A32 - WHD13X1:A32 -
	- WHD15X1:A32 - WHD17X1:A32 - WHD19X1:A32 - WHD21X1:A32 -
	- WHD23X1:A32 - WHD11X1:C32 - WHD13X1:C32 - WHD15X1:C32 -
	- WHD17X1:C32 - WHD19X1:C32 - WHD21X1:C32 - WHD23X1:C32 -
	- WHD11X2:A1 - WHD13X2:A1 - WHD15X2:A1 - WHD17X2:A1 -
	- WHD19X2:A1 - WHD21X2:A1 - WHD23X2:A1 - WHD11X2:C1 -
	- WHD13X2:C1 - WHD15X2:C1 - WHD17X2:C1 - WHD19X2:C1 -
	- WHD21X2:C1 - WHD23X2:C1 - WHD11X2:A7 - WHD13X2:A7 -
	- WHD15X2:A7 - WHD17X2:A7 - WHD19X2:A7 - WHD21X2:A7 -
	- WHD23X2:A7 - WHD11X2:C7 - WHD13X2:C7 - WHD15X2:C7 -
	- WHD17X2:C7 - WHD19X2:C7 - WHD21X2:C7 - WHD23X2:C7 -
	- WHD11X2:A8 - WHD13X2:A8 - WHD15X2:A8 - WHD17X2:A8 -
	- WHD19X2:A8 - WHD21X2:A8 - WHD23X2:A8 - WHD11X2:C8 -
	- WHD13X2:C8 - WHD15X2:C8 - WHD17X2:C8 - WHD19X2:C8 -
	- WHD21X2:C8 - WHD23X2:C8 - WHD11X2:C9 - WHD13X2:C9 -
	- WHD15X2:C9 - WHD17X2:C9 - WHD19X2:C9 - WHD21X2:C9 -
	- WHD23X2:C9 - WHD11X2:C10 - WHD13X2:C10 - WHD15X2:C10 -
	- WHD17X2:C10 - WHD19X2:C10 - WHD21X2:C10 - WHD23X2:C10 -
	- WHD11X2:C11 - WHD13X2:C11 - WHD15X2:C11 - WHD17X2:C11 -
	- WHD19X2:C11 - WHD21X2:C11 - WHD23X2:C11 - WHD11X2:C12 -
	- WHD13X2:C12 - WHD15X2:C12 - WHD17X2:C12 - WHD19X2:C12 -
	- WHD21X2:C12 - WHD23X2:C12 - WHD11X2:C13 - WHD13X2:C13 -
	- WHD15X2:C13 - WHD17X2:C13 - WHD19X2:C13 - WHD21X2:C13 -
	- WHD23X2:C13 - WHD11X2:C14 - WHD13X2:C14 - WHD15X2:C14 -
	- WHD17X2:C14 - WHD19X2:C14 - WHD21X2:C14 - WHD23X2:C14 -
	- WHD13X2:C15 - WHD15X2:C15 - WHD17X2:C15 - WHD19X2:C15 -
	- WHD21X2:C15 - WHD23X2:C15 - WHD11X2:C15 - WHD13X2:C16 -
	- WHD15X2:C16 - WHD17X2:C16 - WHD19X2:C16 - WHD21X2:C16 -
	- WHD23X2:C16 - WHD11X2:A27 - WHD13X2:A27 - WHD15X2:A27 -
	- WHD17X2:A27 - WHD19X2:A27 - WHD21X2:A27 - WHD23X2:A27 -
	- WHD11X2:A28 - WHD13X2:A28 - WHD15X2:A28 - WHD17X2:A28 -
	- WHD19X2:A28 - WHD21X2:A28 - WHD23X2:A28 - WHD11X2:A32 -
	- WHD13X2:A32 - WHD15X2:A32 - WHD17X2:A32 - WHD19X2:A32 -
	- WHD21X2:A32 - WHD23X2:A32 - WHD11X2:C32 - WHD13X2:C32 -
	- WHD15X2:C32 - WHD17X2:C32 - WHD19X2:C32 - WHD21X2:C32 -
	- WHD23X2:C32 - WHD11X2:C16 - WHD25X1:A1 - WHD25X1:C1 -
	- WHD25X1:A24 - WHD25X1:A25 - WHD25X1:A26 - WHD25X1:A32 -
	- WHD25X1:C32 - WHD25X2:A1 - WHD25X2:C1 - WHD25X2:A7 -
	- WHD25X2:C7 - WHD25X2:A8 - WHD25X2:C8 - WHD25X2:C9 -
	- WHD25X2:C10 - WHD25X2:C11 - WHD25X2:C12 - WHD25X2:C13 -
	- WHD25X2:C14 - WHD25X2:C15 - WHD25X2:C16 - WHD25X2:A27 -
	- WHD25X2:A28 - WHD25X2:A32 - WHD25X2:C32
+12V	WHD10:21 - WHD10:23 - WHD10:25 - WHD11X1:A30 -
	- WHD13X1:A30 - WHD15X1:A30 - WHD17X1:A30 - WHD19X1:A30 -
	- WHD21X1:A30 - WHD23X1:A30 - WHD11X1:C30 - WHD13X1:C30 -
	- WHD15X1:C30 - WHD17X1:C30 - WHD19X1:C30 - WHD21X1:C30 -
	- WHD23X1:C30 - WHD11X2:A30 - WHD13X2:A30 - WHD15X2:A30 -
	- WHD17X2:A30 - WHD19X2:A30 - WHD21X2:A30 - WHD23X2:A30 -
	- WHD11X2:C30 - WHD13X2:C30 - WHD15X2:C30 - WHD17X2:C30 -
	- WHD19X2:C30 - WHD21X2:C30 - WHD23X2:C30 - WHD25X1:A30 -
	- WHD25X1:C30 - WHD25X2:A30 - WHD25X2:C30
+5V	WHD10:17 - WHD10:19 - WHD11X1:A27 - WHD13X1:A27 -
	- WHD15X1:A27 - WHD17X1:A27 - WHD19X1:A27 - WHD21X1:A27 -
	- WHD23X1:A27 - WHD11X1:C27 - WHD13X1:C27 - WHD15X1:C27 -
	- WHD17X1:C27 - WHD19X1:C27 - WHD21X1:C27 - WHD23X1:C27 -
	- WHD11X1:A31 - WHD13X1:A31 - WHD15X1:A31 - WHD17X1:A31 -
	- WHD19X1:A31 - WHD21X1:A31 - WHD23X1:A31 - WHD11X1:C31 -
	- WHD13X1:C31 - WHD15X1:C31 - WHD17X1:C31 - WHD19X1:C31 -
	- WHD21X1:C31 - WHD23X1:C31 - WHD11X2:A3 - WHD13X2:A3 -
	- WHD15X2:A3 - WHD17X2:A3 - WHD19X2:A3 - WHD21X2:A3 -
	- WHD23X2:A3 - WHD11X2:C3 - WHD13X2:C3 - WHD15X2:C3 -
	- WHD17X2:C3 - WHD19X2:C3 - WHD21X2:C3 - WHD23X2:C3 -
	- WHD11X2:A5 - WHD13X2:A5 - WHD15X2:A5 - WHD17X2:A5 -
	- WHD19X2:A5 - WHD21X2:A5 - WHD23X2:A5 - WHD11X2:C5 -
	- WHD13X2:C5 - WHD15X2:C5 - WHD17X2:C5 - WHD19X2:C5 -
	- WHD21X2:C5 - WHD23X2:C5 - WHD11X2:A31 - WHD13X2:A31 -
	- WHD15X2:A31 - WHD17X2:A31 - WHD19X2:A31 - WHD21X2:A31 -
	- WHD23X2:A31 - WHD11X2:C31 - WHD13X2:C31 - WHD15X2:C31 -
	- WHD17X2:C31 - WHD19X2:C31 - WHD21X2:C31 - WHD23X2:C31 -
	- WHD10:13 - WHD10:15 - WHD25X1:A27 - WHD25X1:C27 -
	- WHD25X1:A31 - WHD25X1:C31 - WHD25X2:A3 - WHD25X2:C3 -
	- WHD25X2:A5 - WHD25X2:C5 - WHD25X2:A31 - WHD25X2:C31
-12V	WHD10:27 - WHD11X1:A29 - WHD13X1:A29 - WHD15X1:A29 -
	- WHD17X1:A29 - WHD19X1:A29 - WHD21X1:A29 - WHD23X1:A29 -
	- WHD11X1:C29 - WHD13X1:C29 - WHD15X1:C29 - WHD17X1:C29 -
	- WHD19X1:C29 - WHD21X1:C29 - WHD23X1:C29 - WHD11X2:A29 -
	- WHD13X2:A29 - WHD15X2:A29 - WHD17X2:A29 - WHD19X2:A29 -
	- WHD21X2:A29 - WHD23X2:A29 - WHD11X2:C29 - WHD13X2:C29 -
	- WHD15X2:C29 - WHD17X2:C29 - WHD19X2:C29 - WHD21X2:C29 -
	- WHD23X2:C29 - WHD25X1:A29 - WHD25X1:C29 - WHD25X2:A29 -
	- WHD25X2:C29
-5V	WHD10:11 - WHD11X1:A2 - WHD13X1:A2 - WHD15X1:A2 -
	- WHD17X1:A2 - WHD19X1:A2 - WHD21X1:A2 - WHD23X1:A2 -
	- WHD11X1:C2 - WHD13X1:C2 - WHD15X1:C2 - WHD17X1:C2 -
	- WHD19X1:C2 - WHD21X1:C2 - WHD23X1:C2 - WHD25X1:A2 -
	- WHD25X1:C2
AD-OUT 0	WHD11X1:C19 - WHD13X1:C19
AD-OUT 1	WHD11X1:A20 - WHD13X1:A20
AD-OUT 2	WHD11X1:C20 - WHD13X1:C20
AD-OUT 3	WHD11X1:A21 - WHD13X1:A21
AD-OUT 4	WHD11X1:C21 - WHD13X1:C21
AD-OUT 5	WHD11X1:A22 - WHD13X1:A22
AD-OUT 6	WHD11X1:C22 - WHD13X1:C22
AD-OUT 7	WHD11X1:A23 - WHD13X1:A23
BLANK-N	WHD15X2:A14 - WHD17X2:A14 - WHD19X2:A14 - WHD21X2:A14 -
	- WHD23X2:A14 - WHD25X2:A14

BYPASS
CLK
CLK-N
CLK/4
CLK/4-N
COSYN-N
FFT
GAT.FIL
GAT.REC
H PULS
IO/M-N
M-IN 0
M-IN 1
M-IN 2
M-IN 3
M-IN 4
M-IN 5
M-IN 6
M-IN 7
M-IN 8
M-IN 9
M1-OUT
M1-OUT
M1-OUT
M1-OUT
M1-OUT
M1-OUT
M1-OUT
M1-OUT
M1-OUT
M1-OUT
M2-OUT
M2-OUT
M2-OUT
M2-OUT
M2-OUT
M2-OUT
M2-OUT
M2-OUT
M2-OUT
RD-N
RESET
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
SPARE
SUB 0
SUB 1
SUB 2
SUB 3
SUB 4

SUB 7	wHD23X2:A10	GAT.FILL	wHD25X1:A24	0V
0V	wHD23X2:A11	H PULS	wHD25X1:A25	0V
0V	wHD23X2:A12	FFT	wHD25X1:A26	0V
0V	wHD23X2:A13	V PULS	wHD25X1:A27	+5V
+5V	wHD23X2:A14	BLANK-N	wHD25X1:A28	CLK/4
CLK/4	wHD23X2:A15	50HZ	wHD25X1:A29	-12V
-12V	wHD23X2:A17	UP-AD 0	wHD25X1:A30	+12V
+12V	wHD23X2:A18	UP-AD 2	wHD25X1:A31	+5V
+5V	wHD23X2:A19	UP-AD 4	wHD25X1:A32	0V
0V	wHD23X2:A20	UP-AD 6	wHD25X1:C24	wFIFO-N
M1-OUT 4	wHD23X2:A21	UP-A0	wHD25X1:C25	wIN-F2
M1-OUT 6	wHD23X2:A22	UP-A2	wHD25X1:C26	wIN-F1
M1-OUT 8	wHD23X2:A23	UP-A4	wHD25X1:C27	+5V
M2-OUT 1	wHD23X2:A24	UP-A6	wHD25X1:C28	CLK/4-N
M2-OUT 3	wHD23X2:A25	RD-N	wHD25X1:C29	-12V
M2-OUT 5	wHD23X2:A26	RESET	wHD25X1:C30	+12V
M2-OUT 7	wHD23X2:A27	0V	wHD25X1:C31	+5V
M2-OUT 9	wHD23X2:A28	0V	wHD25X1:C32	0V
SUB 0	wHD23X2:A29	-12V	wHD25X2:A1	0V
SUB 2	wHD23X2:A30	+12V	wHD25X2:A2	SPARE 1
SUB 4	wHD23X2:A31	+5V	wHD25X2:A3	+5V
SUB 6	wHD23X2:A32	0V	wHD25X2:A4	CLK
SUB 8	wHD23X2:C10	0V	wHD25X2:A5	+5V
wFIFO-N	wHD23X2:C11	0V	wHD25X2:A6	SPARE 3
wIN-F2	wHD23X2:C12	0V	wHD25X2:A7	0V
wIN-F1	wHD23X2:C13	0V	wHD25X2:A8	0V
+5V	wHD23X2:C14	0V	wHD25X2:A9	GAT.REC
CLK/4-N	wHD23X2:C15	0V	wHD25X2:C1	0V
-12V	wHD23X2:C16	0V	wHD25X2:C2	SPARE 2
+12V	wHD23X2:C17	UP-AD 1	wHD25X2:C3	+5V
+5V	wHD23X2:C18	UP-AD 3	wHD25X2:C4	CLK-N
0V	wHD23X2:C19	UP-AD 5	wHD25X2:C5	+5V
0V	wHD23X2:C20	UP-AD 7	wHD25X2:C6	SPARE 4
SPARE 1	wHD23X2:C21	UP-A1	wHD25X2:C7	0V
+5V	wHD23X2:C22	UP-A3	wHD25X2:C8	0V
CLK	wHD23X2:C23	UP-A5	wHD25X2:C9	0V
+5V	wHD23X2:C24	UP-A7	wHD25X2:A10	GAT.FILL
SPARE 3	wHD23X2:C25	wR-N	wHD25X2:A11	H PULS
0V	wHD23X2:C26	IO/M-N	wHD25X2:A12	FFT
0V	wHD23X2:C27	BYPASS	wHD25X2:A13	V PULS
GAT.REC	wHD23X2:C28	SPARE 5	wHD25X2:A14	BLANK-N
0V	wHD23X2:C29	-12V	wHD25X2:A15	50HZ
SPARE 2	wHD23X2:C30	+12V	wHD25X2:A17	UP-AD 0
+5V	wHD23X2:C31	+5V	wHD25X2:A18	UP-AD 2
CLK-N	wHD23X2:C32	0V	wHD25X2:A19	UP-AD 4
+5V	wHD25X1:A1	0V	wHD25X2:A20	UP-AD 6
SPARE 4	wHD25X1:A2	-5V	wHD25X2:A21	UP-A0
0V	wHD25X1:A3	SPARE 0	wHD25X2:A22	UP-A2
0V	wHD25X1:C1	0V	wHD25X2:A23	UP-A4
0V	wHD25X1:C2	-5V	wHD25X2:A24	UP-A6

RD-N		
RESET		
0V		
0V		
-12V		
+12V		
+5V		
0V		
0V		
0V		
0V		
0V		
0V		
0V		
0V		
UP-AD 1		
UP-AD 3		
UP-AD 5		
UP-AD 7		
UP-A1		
UP-A3		
UP-A5		
UP-A7		
wR-N		
IO/M-N		
BYPASS		
SPARE 5		
-12V		
+12V		
+5V		
0V		

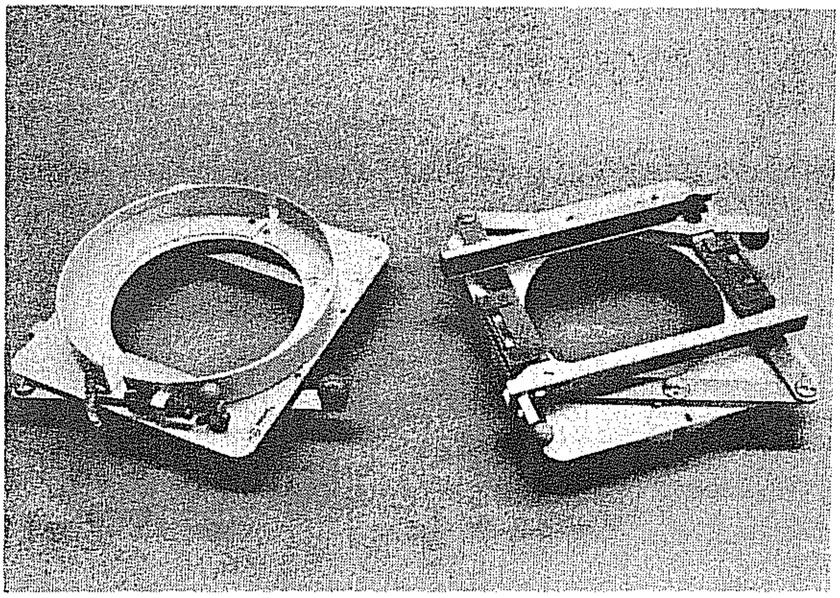
SEQUENCE OF MNEMONICS

0V	wHD10:12 - wHD10:14 - wHD10:16 - wHD10:18 -
	- wHD10:20 - wHD10:22 - wHD10:24 - wHD10:26 -
	- wHD10:28 - wHD10:29 - wHD11X1:A1 - wHD13X1:A1 -
	- wHD15X1:A1 - wHD17X1:A1 - wHD19X1:A1 - wHD21X1:A1 -
	- wHD23X1:A1 - wHD11X1:C1 - wHD13X1:C1 - wHD15X1:C1 -
	- wHD17X1:C1 - wHD19X1:C1 - wHD21X1:C1 - wHD23X1:C1 -
	- wHD13X1:C13 - wHD15X1:C13 - wHD17X1:C13 - wHD19X1:C13 -
	- wHD21X1:C13 - wHD13X1:A19 - wHD15X1:A19 - wHD17X1:A19 -
	- wHD19X1:A19 - wHD21X1:A19 - wHD11X1:A24 - wHD13X1:A24 -
	- wHD15X1:A24 - wHD19X1:A24 - wHD21X1:A24 - wHD23X1:A24 -
	- wHD11X1:A25 - wHD13X1:A25 - wHD15X1:A25 - wHD17X1:A25 -
	- wHD19X1:A25 - wHD21X1:A25 - wHD23X1:A25 - wHD11X1:A26 -
	- wHD13X1:A26 - wHD15X1:A26 - wHD17X1:A26 - wHD19X1:A26 -
	- wHD21X1:A26 - wHD23X1:A26 - wHD11X1:A32 - wHD13X1:A32 -
	- wHD15X1:A32 - wHD17X1:A32 - wHD19X1:A32 - wHD21X1:A32 -
	- wHD23X1:A32 - wHD11X1:C32 - wHD13X1:C32 - wHD15X1:C32 -
	- wHD17X1:C32 - wHD19X1:C32 - wHD21X1:C32 - wHD23X1:C32 -
	- wHD11X2:A1 - wHD13X2:A1 - wHD15X2:A1 - wHD17X2:A1 -
	- wHD19X2:A1 - wHD21X2:A1 - wHD23X2:A1 - wHD11X2:C1 -
	- wHD13X2:C1 - wHD15X2:C1 - wHD17X2:C1 - wHD19X2:C1 -
	- wHD21X2:C1 - wHD23X2:C1 - wHD11X2:A7 - wHD13X2:A7 -
	- wHD15X2:A7 - wHD17X2:A7 - wHD19X2:A7 - wHD21X2:A7 -
	- wHD23X2:A7 - wHD11X2:C7 - wHD13X2:C7 - wHD15X2:C7 -
	- wHD17X2:C7 - wHD19X2:C7 - wHD21X2:C7 - wHD23X2:C7 -
	- wHD11X2:A8 - wHD13X2:A8 - wHD15X2:A8 - wHD17X2:A8 -
	- wHD19X2:A8 - wHD21X2:A8 - wHD23X2:A8 - wHD11X2:C8 -
	- wHD13X2:C8 - wHD15X2:C8 - wHD17X2:C8 - wHD19X2:C8 -
	- wHD21X2:C8 - wHD23X2:C8 - wHD11X2:C9 - wHD13X2:C9 -
	- wHD15X2:C9 - wHD17X2:C9 - wHD19X2:C9 - wHD21X2:C9 -
	- wHD23X2:C9 - wHD11X2:C10 - wHD13X2:C10 - wHD15X2:C10 -
	- wHD17X2:C10 - wHD19X2:C10 - wHD21X2:C10 - wHD23X2:C10 -
	- wHD11X2:C11 - wHD13X2:C11 - wHD15X2:C11 - wHD17X2:C11 -
	- wHD19X2:C11 - wHD21X2:C11 - wHD23X2:C11 - wHD11X2:C12 -
	- wHD13X2:C12 - wHD15X2:C12 - wHD17X2:C12 - wHD19X2:C12 -
	- wHD21X2:C12 - wHD23X2:C12 - wHD11X2:C13 - wHD13X2:C13 -
	- wHD15X2:C13 - wHD17X2:C13 - wHD19X2:C13 - wHD21X2:C13 -
	- wHD23X2:C13 - wHD11X2:C14 - wHD13X2:C14 - wHD15X2:C14 -
	- wHD17X2:C14 - wHD19X2:C14 - wHD21X2:C14 - wHD23X2:C14 -
	- wHD13X2:C15 - wHD15X2:C15 - wHD17X2:C15 - wHD19X2:C15 -
	- wHD21X2:C15 - wHD23X2:C15 - wHD11X2:C15 - wHD13X2:C16 -
	- wHD15X2:C16 - wHD17X2:C16 - wHD19X2:C16 - wHD21X2:C16 -
	- wHD23X2:C16 - wHD11X2:A27 - wHD13X2:A27 - wHD15X2:A27 -
	- wHD17X2:A27 - wHD19X2:A27 - wHD21X2:A27 - wHD23X2:A27 -
	- wHD11X2:A28 - wHD13X2:A28 - wHD15X2:A28 - wHD17X2:A28 -
	- wHD19X2:A28 - wHD21X2:A28 - wHD23X2:A28 - wHD11X2:A32 -
	- wHD13X2:A32 - wHD15X2:A32 - wHD17X2:A32 - wHD19X2:A32 -
	- wHD21X2:A32 - wHD23X2:A32 - wHD11X2:C32 - wHD13X2:C32 -
	- wHD15X2:C32 - wHD17X2:C32 - wHD19X2:C32 - wHD21X2:C32 -
	- wHD23X2:C32 - wHD11X2:C16 - wHD25X1:A1 - wHD25X1:C1 -
	- wHD25X1:A24 - wHD25X1:A25 - wHD25X1:A26 - wHD25X1:A32 -
	- wHD25X1:C32 - wHD25X2:A1 - wHD25X2:C1 - wHD25X2:A7 -
	- wHD25X2:C7 - wHD25X2:A8 - wHD25X2:C8 - wHD25X2:C9 -
	- wHD25X2:C10 - wHD25X2:C11 - wHD25X2:C12 - wHD25X2:C13 -
	- wHD25X2:C14 - wHD25X2:C15 - wHD25X2:C16 - wHD25X2:A27 -
	- wHD25X2:A28 - wHD25X2:A32 - wHD25X2:C32
+12V	wHD10:21 - wHD10:23 - wHD10:25 - wHD11X1:A30 -
	- wHD13X1:A30 - wHD15X1:A30 - wHD17X1:A30 - wHD19X1:A30 -
	- wHD21X1:A30 - wHD23X1:A30 - wHD11X1:C30 - wHD13X1:C30 -
	- wHD15X1:C30 - wHD17X1:C30 - wHD19X1:C30 - wHD21X1:C30 -
	- wHD23X1:C30 - wHD11X2:A30 - wHD13X2:A30 - wHD15X2:A30 -
	- wHD17X2:A30 - wHD19X2:A30 - wHD21X2:A30 - wHD23X2:A30 -
	- wHD11X2:C30 - wHD13X2:C30 - wHD15X2:C30 - wHD17X2:C30 -
	- wHD19X2:C30 - wHD21X2:C30 - wHD23X2:C30 - wHD25X1:A30 -
	- wHD25X1:C30 - wHD25X2:A30 - wHD25X2:C30
+5V	wHD10:17 - wHD10:19 - wHD11X1:A27 - wHD13X1:A27 -
	- wHD15X1:A27 - wHD17X1:A27 - wHD19X1:A27 - wHD21X1:A27 -
	- wHD23X1:A27 - wHD11X1:C27 - wHD13X1:C27 - wHD15X1:C27 -
	- wHD17X1:C27 - wHD19X1:C27 - wHD21X1:C27 - wHD23X1:C27 -
	- wHD11X1:A31 - wHD13X1:A31 - wHD15X1:A31 - wHD17X1:A31 -
	- wHD19X1:A31 - wHD21X1:A31 - wHD23X1:A31 - wHD11X1:C31 -
	- wHD13X1:C31 - wHD15X1:C31 - wHD17X1:C31 - wHD19X1:C31 -
	- wHD21X1:C31 - wHD23X1:C31 - wHD11X2:A3 - wHD13X2:A3 -
	- wHD15X2:A3 - wHD17X2:A3 - wHD19X2:A3 - wHD21X2:A3 -
	- wHD23X2:A3 - wHD11X2:C3 - wHD13X2:C3 - wHD15X2:C3 -
	- wHD17X2:C3 - wHD19X2:C3 - wHD21X2:C3 - wHD23X2:C3 -
	- wHD11X2:A5 - wHD13X2:A5 - wHD15X2:A5 - wHD17X2:A5 -
	- wHD19X2:A5 - wHD21X2:A5 - wHD23X2:A5 - wHD11X2:C5 -
	- wHD13X2:C5 - wHD15X2:C5 - wHD17X2:C5 - wHD19X2:C5 -
	- wHD21X2:C5 - wHD23X2:C5 - wHD11X2:A31 - wHD13X2:A31 -
	- wHD15X2:A31 - wHD17X2:A31 - wHD19X2:A31 - wHD21X2:A31 -
	- wHD23X2:A31 - wHD11X2:C31 - wHD13X2:C31 - wHD15X2:C31 -
	- wHD17X2:C31 - wHD19X2:C31 - wHD21X2:C31 - wHD23X2:C31 -
	- wHD10:13 - wHD10:15 - wHD25X1:A27 - wHD25X1:C27 -
	- wHD25X1:A31 - wHD25X1:C31 - wHD25X2:A3 - wHD25X2:C3 -
	- wHD25X2:A5 - wHD25X2:C5 - wHD25X2:A31 - wHD25X2:C31
-12V	wHD10:27 - wHD11X1:A29 - wHD13X1:A29 - wHD15X1:A29 -
	- wHD17X1:A29 - wHD19X1:A29 - wHD21X1:A29 - wHD23X1:A29 -
	- wHD11X1:C29 - wHD13X1:C29 - wHD15X1:C29 - wHD17X1:C29 -
	- wHD19X1:C29 - wHD21X1:C29 - wHD23X1:C29 - wHD11X2:A29 -
	- wHD13X2:A29 - wHD15X2:A29 - wHD17X2:A29 - wHD19X2:A29 -
	- wHD21X2:A29 - wHD23X2:A29 - wHD11X2:C29 - wHD13X2:C29 -
	- wHD15X2:C29 - wHD17X2:C29 - wHD19X2:C29 - wHD21X2:C29 -
	- wHD23X2:C29 - wHD25X1:A29 - wHD25X1:C29 - wHD25X2:A29 -
	- wHD25X2:C29
-5V	wHD10:11 - wHD11X1:A2 - wHD13X1:A2 - wHD15X1:A2 -
	- wHD17X1:A2 - wHD19X1:A2 - wHD21X1:A2 - wHD23X1:A2 -
	- wHD11X1:C2 - wHD13X1:C2 - wHD15X1:C2 - wHD17X1:C2 -
	- wHD19X1:C2 - wHD21X1:C2 - wHD23X1:C2 - wHD25X1:A2 -
	- wHD25X1:C2
AD-OUT 0	wHD11X1:C19 - wHD13X1:C19
AD-OUT 1	wHD11X1:A20 - wHD13X1:A20
AD-OUT 2	wHD11X1:C20 - wHD13X1:C20
AD-OUT 3	wHD11X1:A21 - wHD13X1:A21
AD-OUT 4	wHD11X1:C21 - wHD13X1:C21
AD-OUT 5	wHD11X1:A22 - wHD13X1:A22
AD-OUT 6	wHD11X1:C22 - wHD13X1:C22
AD-OUT 7	wHD11X1:A23 - wHD13X1:A23
BLANK-N	wHD15X2:A14 - wHD17X2:A14 - wHD19X2:A14 - wHD21X2:A14 -
	- wHD23X2:A14 - wHD25X2:A14
BYPASS	wHD11X2:C27 - wHD13X2:C27 - wHD15X2:C27 - wHD17X2:C27 -
	- wHD19X2:C27 - wHD21X2:C27 - wHD23X2:C27 - wHD25X2:C27
CLK	wHD11X2:A4 - wHD13X2:A4 - wHD15X2:A4 - wHD17X2:A4 -
	- wHD19X2:A4 - wHD21X2:A4 - wHD23X2:A4 - wHD25X2:A4
CLK-N	wHD11X2:C4 - wHD13X2:C4 - wHD15X2:C4 - wHD17X2:C4 -
	- wHD19X2:C4 - wHD21X2:C4 - wHD23X2:C4 - wHD25X2:C4
CLK/4	wHD11X1:A28 - wHD13X1:A28 - wHD15X1:A28 - wHD17X1:A28 -
	- wHD19X1:A28 - wHD21X1:A28 - wHD23X1:A28 - wHD25X1:A28
CLK/4-N	wHD11X1:C28 - wHD13X1:C28 - wHD15X1:C28 - wHD17X1:C28 -
	- wHD19X1:C28 - wHD21X1:C28 - wHD23X1:C28 - wHD25X1:C28
COSYN-N	wHD11X2:A16 - wHD13X2:A16 - wHD15X2:A16 - wHD17X2:A16
FFT	wHD11X2:A12 - wHD13X2:A12 - wHD15X2:A12 - wHD17X2:A12 -
	- wHD19X2:A12 - wHD21X2:A12 - wHD23X2:A12 - wHD25X2:A12
GAT.FILL	wHD15X2:A10 - wHD17X2:A10 - wHD19X2:A10 - wHD21X2:A10 -
	- wHD23X2:A10 - wHD25X2:A10
GAT.REC	wHD15X2:A9 - wHD17X2:A9 - wHD19X2:A9 - wHD21X2:A9 -
	- wHD23X2:A9 - wHD25X2:A9
H PULS	wHD11X2:A11 - wHD13X2:A11 - wHD15X2:A11 - wHD17X2:A11 -
	- wHD19X2:A11 - wHD21X2:A11 - wHD23X2:A11 - wHD25X2:A11
IO/M-N	wHD13X2:C26 - wHD15X2:C26 - wHD17X2:C26 - wHD19X2:C26 -
	- wHD21X2:C26 - wHD23X2:C26 - wHD25X2:C26
M-IN 0	wHD13X1:C3 - wHD13X1:C3 - wHD17X1:C3 - wHD19X1:C3 -
	- wHD21X1:C3 - wHD23X1:C3
M-IN 1	wHD13X1:A4 - wHD15X1:A4 - wHD17X1:A4 - wHD19X1:A4 -
	- wHD21X1:A4 - wHD23X1:A4
M-IN 2	wHD13X1:C4 - wHD15X1:C4 - wHD17X1:C4 - wHD19X1:C4 -
	- wHD21X1:C4 - wHD23X1:C4
M-IN 3	wHD13X1:A5 - wHD15X1:A5 - wHD17X1:A5 - wHD19X1:A5 -
	- wHD21X1:A5 - wHD23X1:A5
M-IN 4	wHD17X1:C5 - wHD19X1:C5 - wHD21X1:C5 - wHD13X1:C5 -
	- wHD15X1:C5 - wHD23X1:C5
M-IN 5	wHD13X1:A6 - wHD15X1:A6 - wHD17X1:A6 - wHD19X1:A6 -
	- wHD21X1:A6 - wHD23X1:A6
M-IN 6	wHD13X1:C6 - wHD15X1:C6 - wHD17X1:C6 - wHD19X1:C6 -
	- wHD21X1:C6 - wHD23X1:C6
M-IN 7	wHD13X1:A7 - wHD15X1:A7 - wHD17X1:A7 - wHD19X1:A7 -
	- wHD21X1:A7 - wHD23X1:A7
M-IN 8	wHD13X1:C7 - wHD15X1:C7 - wHD17X1:C7 - wHD19X1:C7 -
	- wHD21X1:C7 - wHD23X1:C7
M-IN 9	wHD13X1:A8 - wHD15X1:A8 - wHD17X1:A8 - wHD17X1:A8 -
	- wHD21X1:A8 - wHD23X1:A8
M1-OUT 0	wHD13X1:C8 - wHD15X1:C8 - wHD17X1:C8 - wHD19X1:C8 -
	- wHD21X1:C8 - wHD23X1:C8
M1-OUT 1	wHD13X1:A9 - wHD15X1:A9 - wHD17X1:A9 - wHD19X1:A9 -
	- wHD21X1:A9 - wHD23X1:A9
M1-OUT 2	wHD13X1:C9 - wHD15X1:C9 - wHD17X1:C9 - wHD19X1:C9 -
	- wHD21X1:C9 - wHD23X1:C9
M1-OUT 3	wHD13X1:A10 - wHD15X1:A10 - wHD17X1:A10 - wHD19X1:A10 -
	- wHD21X1:A10 - wHD23X1:A10
M1-OUT 4	wHD13X1:C10 - wHD15X1:C10 - wHD17X1:C10 - wHD19X1:C10 -
	- wHD21X1:C10 - wHD23X1:C10
M1-OUT 5	wHD13X1:A11 - wHD15X1:A11 - wHD17X1:A11 - wHD19X1:A11 -
	- wHD21X1:A11 - wHD23X1:A11
M1-OUT 6	wHD13X1:C11 - wHD15X1:C11 - wHD17X1:C11 - wHD19X1:C11 -
	- wHD21X1:C11 - wHD23X1:C11
M1-OUT 7	wHD13X1:A12 - wHD15X1:A12 - wHD17X1:A12 - wHD19X1:A12 -
	- wHD21X1:A12 - wHD23X1:A12
M1-OUT 8	wHD13X1:C12 - wHD15X1:C12 - wHD17X1:C12 - wHD19X1:C12 -
	- wHD21X1:C12 - wHD23X1:C12
M1-OUT 9	wHD13X1:A13 - wHD15X1:A13 - wHD17X1:A13 - wHD19X1:A13 -
	- wHD21X1:A13 - wHD23X1:A13
M2-OUT 0	wHD13X1:A14 - wHD15X1:A14 - wHD17X1:A14 - wHD19X1:A14 -
	- wHD21X1:A14 - wHD23X1:A14
M2-OUT 1	wHD13X1:C14 - wHD15X1:C14 - wHD17X1:C14 - wHD19X1:C14 -
	- wHD21X1:C14 - wHD23X1:C14
M2-OUT 2	wHD13X1:A15 - wHD15X1:A15 - wHD17X1:A15 - wHD19X1:A15 -
	- wHD21X1:A15 - wHD23X1:A15
M2-OUT 3	wHD13X1:C15 - wHD15X1:C15 - wHD17X1:C15 - wHD19X1:C15 -
	- wHD21X1:C15 - wHD23X1:C15
M2-OUT 4	wHD13X1:A16 - wHD15X1:A16 - wHD17X1:A16 - wHD19X1:A16 -
	- wHD21X1:A16 - wHD23X1:A16
M2-OUT 5	wHD13X1:C16 - wHD15X1:C16 - wHD17X1:C16 - wHD19X1:C16 -
	- wHD21X1:C16 - wHD23X1:C16
M2-OUT 6	wHD13X1:A17 - wHD15X1:A17 - wHD17X1:A17 - wHD19X1:A17 -
	- wHD21X1:A17 - wHD23X1:A17
M2-OUT 7	wHD13X1:C17 - wHD15X1:C17 - wHD17X1:C17 - wHD19X1:C17 -
	- wHD21X1:C17 - wHD23X1:C17
M2-OUT 8	wHD13X1:A18 - wHD15X1:A18 - wHD17X1:A18 - wHD19X1:A18 -
	- wHD21X1:A18 - wHD23X1:A18
M2-OUT 9	wHD13X1:C18 - wHD15X1:C18 - wHD17X1:C18 - wHD19X1:C18 -
	- wHD21X1:C18 - wHD23X1:C18
RD-N	wHD13X2:A25 - wHD15X2:A25 - wHD17X2:A25 - wHD19X2:A25 -
	- wHD21X2:A25 - wHD23X2:A25 - wHD25X2:A25
RESET	wHD13X2:A26 - wHD15X2:A26 - wHD17X2:A26 - wHD19X2:A26 -
	- wHD21X2:A26 - wHD23X2:A26 - wHD25X2:A26
SPARE 0	wHD11X1:A3 - wHD13X1:A3 - wHD15X1:A3 - wHD17X1:A3 -
	- wHD19X1:A3 - wHD21X1:A3 - wHD23X1:A3 - wHD25X1:A3
SPARE 1	wHD11X2:A2 - wHD13X2:A2 - wHD15X2:A2 - wHD17X2:A2 -
	- wHD19X2:A2 - wHD21X2:A2 - wHD23X2:A2 - wHD25X2:A2
SPARE 2	wHD11X2:C2 - wHD13X2:C2 - wHD15X2:C2 - wHD17X2:C2 -
	- wHD19X2:C2 - wHD21X2:C2 - wHD23X2:C2 - wHD25X2:C2
SPARE 3	wHD11X2:A6 - wHD13X2:A6 - wHD15X2:A6 - wHD17X2:A6 -
	- wHD19X2:A6 - wHD21X2:A6 - wHD23X2:A6 - wHD25X2:A6
SPARE 4	wHD11X2:C6 - wHD13X2:C6 - wHD15X2:C6 - wHD17X2:C6 -
	- wHD19X2:C6 - wHD21X2:C6 - wHD23X2:C6 - wHD25X2:C6
SPARE 5	wHD11X2:C28 - wHD13X2:C28 - wHD15X2:C28 - wHD17X2:C28 -
	- wHD19X2:C28 - wHD21X2:C28 - wHD23X2:C28 - wHD25X2:C28
SPARE 6	wHD11X1:C24 - wHD13X1:C24 - wHD15X1:C24 - wHD17X1:C24 -
	- wHD19X1:C24
SUB 0	wHD15X1:C19 - wHD17X1:C19 - wHD19X1:C19 - wHD21X1:C19 -
	- wHD23X1:C19
SUB 1	wHD15X1:A20 - wHD17X1:A20 - wHD19X1:A20 - wHD21X1:A20 -
	- wHD23X1:A20
SUB 2	wHD15X1:C20 - wHD17X1:C20 - wHD19X1:C20 - wHD21X1:C20 -
	- wHD23X1:C20
SUB 3	wHD15X1:A21 - wHD17X1:A21 - wHD19X1:A21 - wHD21X1:A21 -
	- wHD23X1:A21
SUB 4	wHD15X1:C21 - wHD17X1:C21 - wHD19X1:C21 - wHD21X1:C21 -
	- wHD23X1:C21
SUB 5	wHD15X1:A22 - wHD17X1:A22 - wHD19X1:A22 - wHD21X1:A22 -
	- wHD23X1:A22
SUB 6	wHD15X1:C22 - wHD17X1:C22 - wHD19X1:C22 - wHD21X1:C22 -
	- wHD23X1:C22
SUB 7	wHD15X1:A23 - wHD17X1:A23 - wHD19X1:A23 - wHD21X1:A23 -
	- wHD23X1:A23
SUB 8	wHD15X1:C23 - wHD17X1:C23 - wHD19X1:C23 - wHD21X1:C23 -
	- wHD23X1:C23
UP-AD 0	wHD13X2:A17 - wHD15X2:A17 - wHD17X2:A17 - wHD19X2:A17 -
	- wHD21X2:A17 - wHD23X2:A17 - wHD25X2:A17
UP-AD 1	wHD13X2:C17 - wHD15X2:C17 - wHD17X2:C17 - wHD19X2:C17 -
	- wHD21X2:C17 - wHD23X2:C17 - wHD25X2:C17
UP-AD 2	wHD13X2:A18 - wHD15X2:A18 - wHD17X2:A18 - wHD19X2:A18 -
	- wHD21X2:A18 - wHD23X2:A18 - wHD25X2:A18
UP-AD 3	wHD13X2:C18 - wHD15X2:C18 - wHD17X2:C18 - wHD19X2:C18 -
	- wHD21X2:C18 - wHD23X2:C18 - wHD25X2:C18
UP-AD 4	wHD13X2:A19 - wHD15X2:A19 - wHD17X2:A19 - wHD19X2:A19 -
	- wHD21X2:A19 - wHD23X2:A19 - wHD25X2:A19
UP-AD 5	wHD13X2:C19 - wHD15X2:C19 - wHD17X2:C19 - wHD19X2:C19 -
	- wHD21X2:C19 - wHD23X2:C19 - wHD25X2:C19
UP-AD 6	wHD13X2:A20 - wHD15X2:A20 - wHD17X2:A20 - wHD19X2:A20 -
	- wHD21X2:A20 - wHD23X2:A20 - wHD25X2:A20
UP-AD 7	wHD13X2:C20 - wHD15X2:C20 - wHD17X2:C20 - wHD19X2:C20 -
	- wHD21X2:C20 - wHD23X2:C20 - wHD25X2:C20
UP-A0	wHD13X2:A21 - wHD15X2:A21 - wHD17X2:A21 - wHD19X2:A21 -
	- wHD21X2:A21 - wHD23X2:A21 - wHD25X2:A21
UP-A1	wHD13X2:C21 - wHD15X2:C21 - wHD17X2:C21 - wHD19X2:C21 -
	- wHD21X2:C21 - wHD23X2:C21 - wHD25X2:C21
UP-A2	wHD13X2:A22 - wHD15X2:A22 - wHD17X2:A22 - wHD19X2:A22 -
	- wHD21X2:A22 - wHD23X2:A22 - wHD25X2:A22
UP-A3	wHD13X2:C22 - wHD15X2:C22 - wHD17X2:C22 - wHD19X2:C22 -
	- wHD21X2:C22 - wHD23X2:C22 - wHD25X2:C22
UP-A4	wHD13X2:A23 - wHD15X2:A23 - wHD17X2:A23 - wHD19X2:A23 -
	- wHD21X2:A23 - wHD23X2:A23 - wHD25X2:A23
UP-A5	wHD13X2:C23 - wHD15X2:C23 - wHD17X2:C23 - wHD19X2:C23 -
	- wHD21X2:C23 - wHD23X2:C23 - wHD25X2:C23
UP-A6	wHD13X2:A24 - wHD15X2:A24 - wHD17X2:A24 - wHD19X2:A24 -
	- wHD21X2:A24 - wHD23X2:A24 - wHD25X2:A24
UP-A7	wHD13X2:C24 - wHD15X2:C24 - wHD17X2:C24 - wHD19X2:C24 -
	- wHD21X2:C24 - wHD23X2:C24 - wHD25X2:C24
V PULS	wHD11X2:A13 - wHD13X2:A13 - wHD15X2:A13 - wHD17X2:A13 -
	- wHD19X2:A13 - wHD21X2:A13 - wHD23X2:A13 - wHD25X2:A13
wFIFO-N	wHD21X1:C24 - wHD23X1:C24 - wHD25X1:C24
wIN-F1	wHD15X1:C26 - wHD17X1:C26 - wHD19X1:C26 - wHD21X1:C26 -
	- wHD23X1:C26 - wHD25X1:C26
wIN-F2	wHD15X1:C25 - wHD17X1:C25 - wHD19X1:C25 - wHD21X1:C25 -
	- wHD23X1:C25 - wHD25X1:C25
wR-N	wHD13X2:C25 - wHD15X2:C25 - wHD17X2:C25 - wHD19X2:C25 -
	- wHD21X2:C25 - wHD23X2:C25 - wHD25X2:C25
50HZ	wHD11X2:A15 - wHD13X2:A15 - wHD15X2:A15 - wHD17X2:A15 -
	- wHD19X2:A15 - wHD21X2:A15 - wHD23X2:A15 - wHD25X2:A15

LAY-OUT + WIRING LIST

SERVICE MANUAL-UNIT
Detachable Cassette Holder for BV25 (IEC)

PEI 9807 600 80001



Suitable for a cassette or grid cassette.
Cassette sizes: 24 x 30 cm or 20 x 40 cm.
Rotatable over 360^{0} round I.I. shield. I.E.C. version.

File this sheet in the Service Documentation Set of BV25 system, under tab Accessories BV25.
Q-list 9807 600 80001 can be ordered separately.

IPC: Eindhoven

Manual order number: 4522 983 10021

Printed in the Netherlands (84.0)

parts list

Philips Medical Systems Nederland B.V. | Technical Service | Best

SERVICE PARTSLIST UNIT

PEI: 9807 600 80001

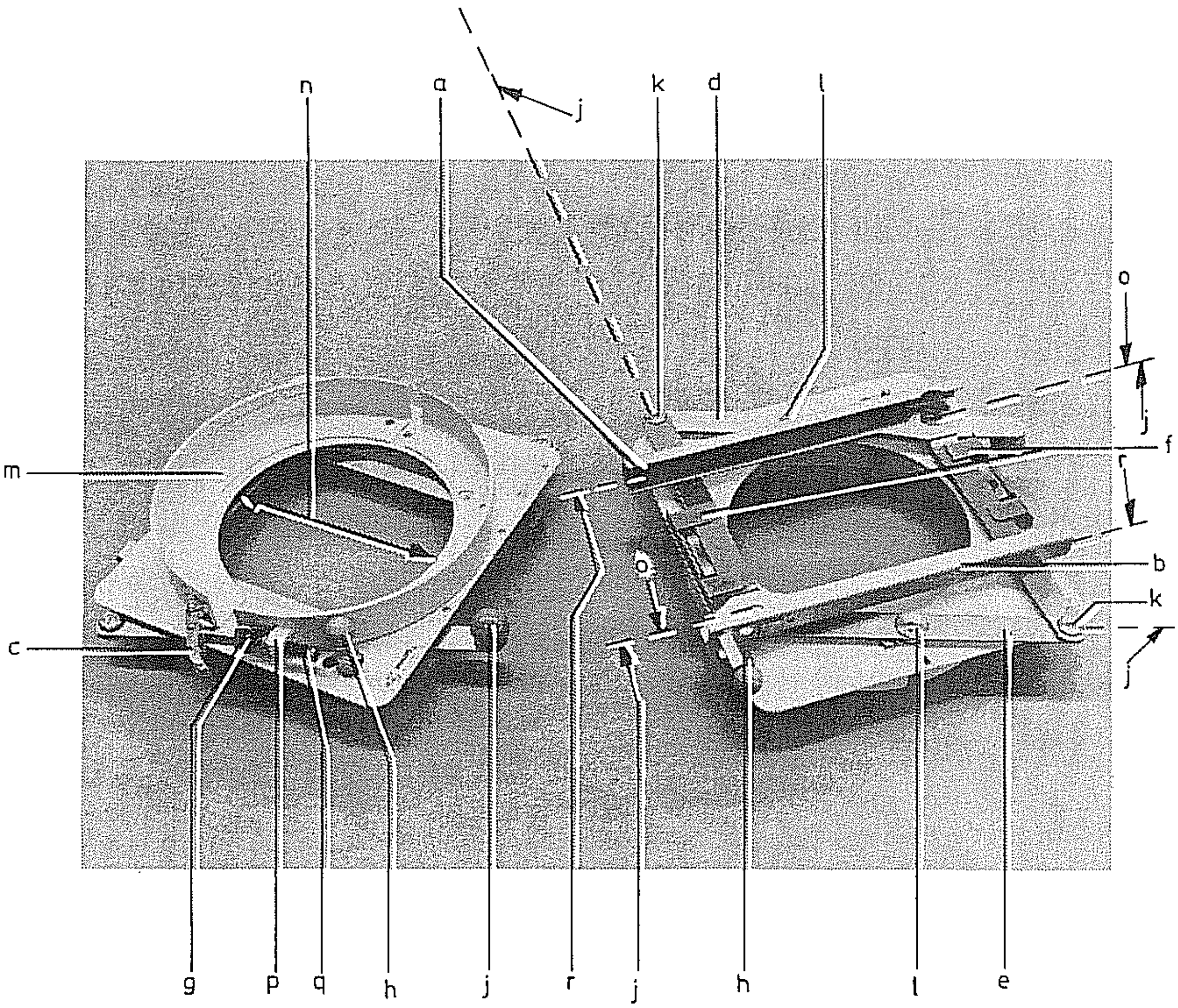
DESCRIPTION: CASSETTE HOLDER IEC

SERIAL NR:

List of pages and drawings

*printing instructions 4522 983 26041

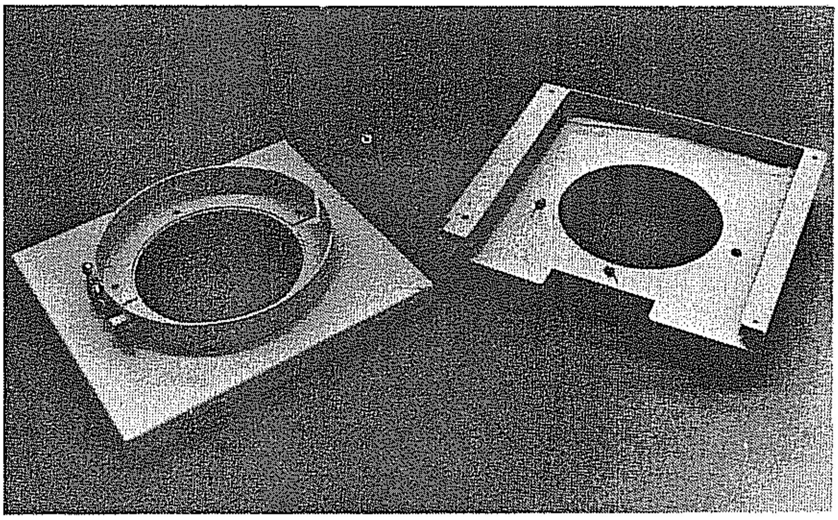
SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
PZ-1	a	4522 126 50731	cassetteholder assy right	
PZ-1	b	4522 126 50721	cassetteholder assy left	
PZ-1	c	4512 917 19951	fixing handle	
PZ-1	d	4522 126 50741	plate	
PZ-1	e	4522 126 50851	plate	
PZ-1	f	4522 126 50781	guiding bracket	2x
PZ-1	g	4522 126 09303	bracket	
PZ-1	h	4512 917 19841	fixing shaft	2x
PZ-1	h	4522 126 56011	guiding bush	2x
PZ-1	h	2622 890 00009	ball bearing	2x
PZ-1	h	4512 903 08541	compression spring	2x
PZ-1	h	4522 102 26181	set screw	2x
PZ-1	h	2922 500 03002	knob, d=18 (mushroom)	2x
PZ-1	h	4512 917 19832	guiding bush,hexagonal	2x
PZ-1	i	2922 500 03003	knob, d=25 (mushroom)	
PZ-1	j	4512 917 19872	ring	4x
PZ-1	j	4522 102 25561	ring, 13x18x0.15	4x
PZ-1	k	4512 917 19901	flange nut M4D12D1 15H6.5	2x
PZ-1	l	4512 917 19911	flange nut M4D12D1 20H8.5	2x
PZ-1	m	4512 917 19921	guiding ring	2x
PZ-1	n	4512 903 05431	extension spring	2x
PZ-1	o	4512 917 72661	flange nut, M4D12D1 15H8.5	2x
PZ-1	p	2622 008 01094	sleeve bearing bush	4x10
PZ-1	q	2622 115 10002	Belleville washer 8x4.2	28x
PZ-1	r	4522 126 09532	clamping strip	2x



n
a
j
k
d
l
o
j
f
r
m
b
k
c
j
o
g
p
q
h
j
r
j
h
l
e

SERVICE MANUAL-UNIT
Detachable Cassette Holder for BV25 (HHS)

PEI 9807 600 90001



Suitable for a cassette, grid cassette or detachable cassette.
Cassette size: 24 x 24 cm.
Rotatable over 360° round I.I. shield. HHS version.

File this sheet in the Service Documentation Set of BV25 system, under tab Accessories BV25.
Q-list 9807 600 90001 can be ordered separately.

IPC: Eindhoven

Manual order number: 4522 983 10031

Printed in the Netherlands (84.1)

PHILIPS

Philips Medical Systems

parts list

Philips Medical Systems Nederland B.V. | Technical Service | Best

SERVICE PARTS LIST UNIT

PEI: 9807 600 90001

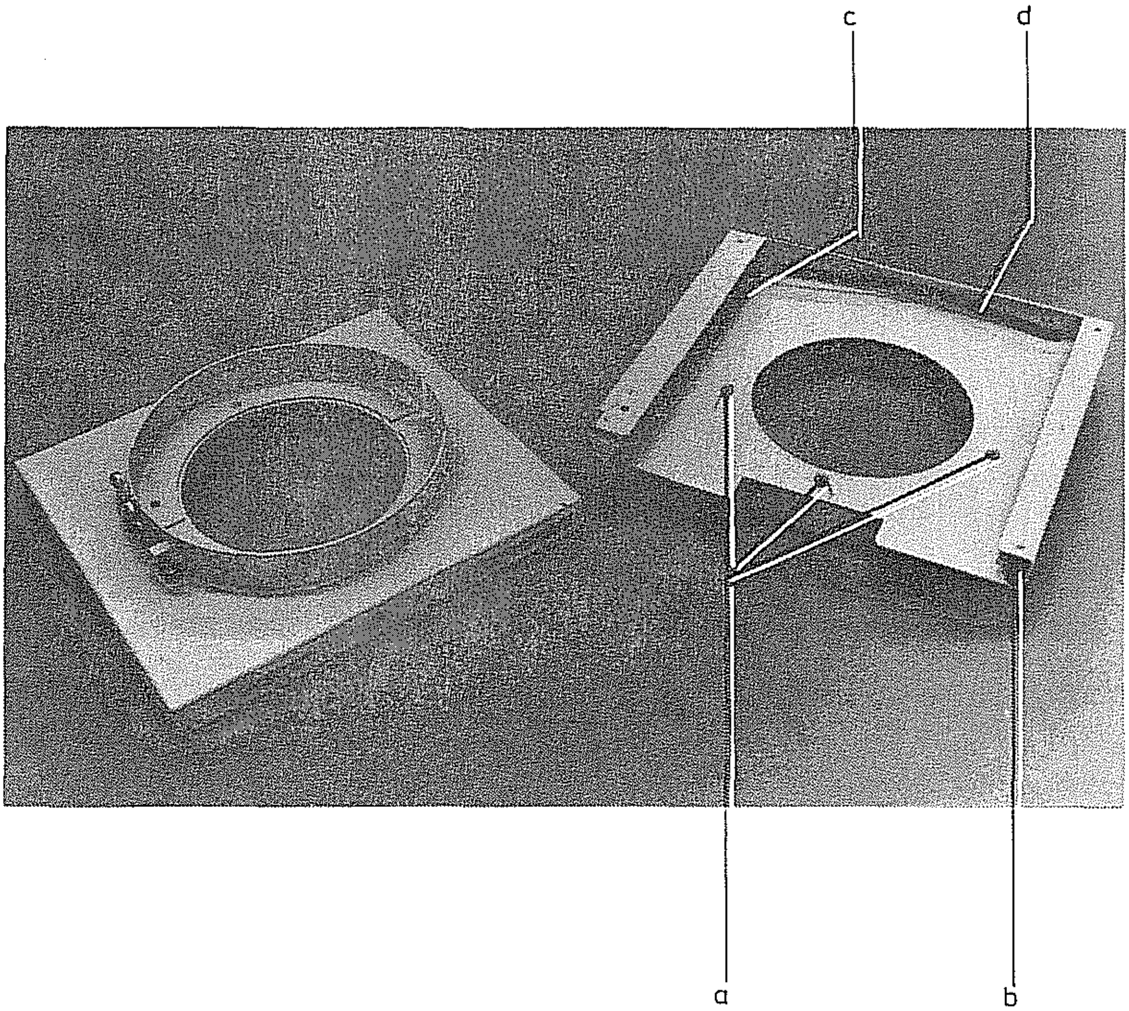
DESCRIPTION: Cassetteholder HHS

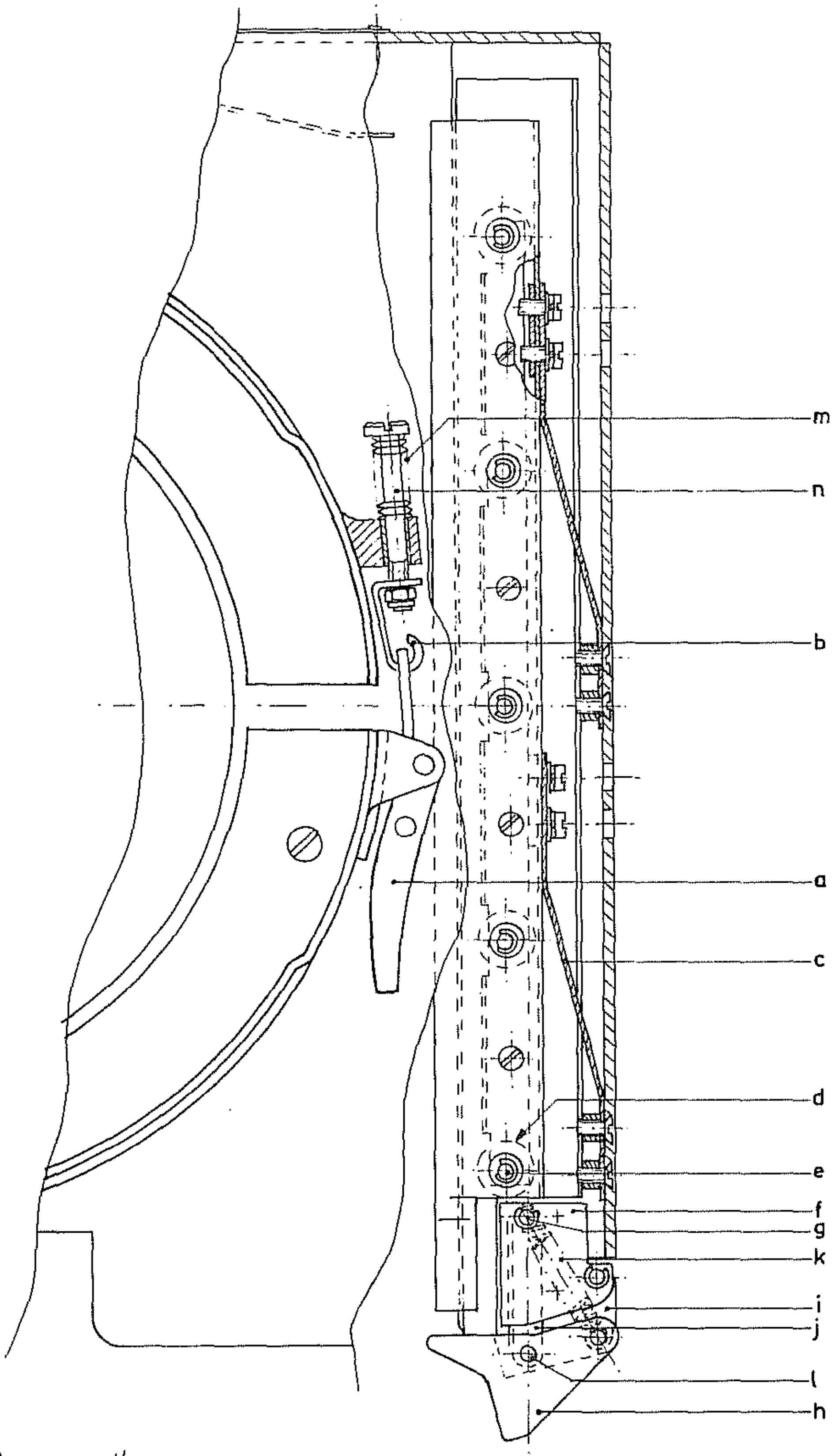
SERIAL NR:

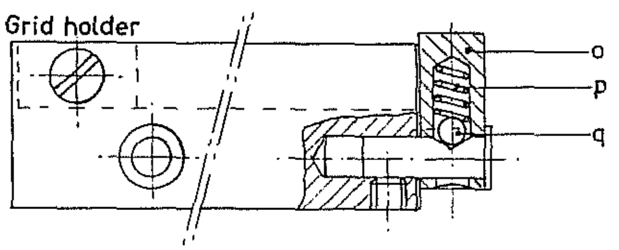
List of pages and drawings

*printing instructions 4522 983 26031

SCHEME/ PAGE 1	POSITION 2	CODENUMBER 3	DESCRIPTION 4	DATA 5
PZ-1	a	4512 917 19921	Guide ring	3x
PZ-1	b	4522 102 28404	Angle rail, left	
PZ-1	c	4522 102 28323	Angle rail, right	
PZ-1	d	4522 102 77742	Leaf spring	
PZ-2	a	4512 917 19951	Fixing handle	
PZ-2	b	4522 126 09302	Bracket, hook	
PZ-2	c	4522 102 77701	Leaf spring	2x
PZ-2	d	4522 102 77661	Roller	5x
PZ-2	e	4522 102 77642	Shaft	5x
PZ-2	f	4522 102 77582	Bracket	
PZ-2	g	4522 102 77621	Shaft	2x
PZ-2		4522 102 77601	Bush	2x
PZ-2	h	4522 121 69724	Knob	
PZ-2	i	4522 920 91222	Profile	
PZ-2	j	4522 920 91202	Profile	
PZ-2	k	4522 927 53263	Extension spring	
PZ-2	l	4522 920 08263	Shaft	2x
PZ-2	m	2622 115 10002	Belleville washer	28x
PZ-2	n	2622 008 01094	Sleeve bearing bush	
			For gridholder, if mounted :	
		4522 126 09701	Guide, left	
		4522 126 09712	Guide, right	
		4522 126 09721	Buffer	
PZ-2	o	4522 121 78483	Pawl	
PZ-2	p	4522 121 78501	Compression spring	
PZ-2	q	2622 890 00012	Ball	


c
d
a
b

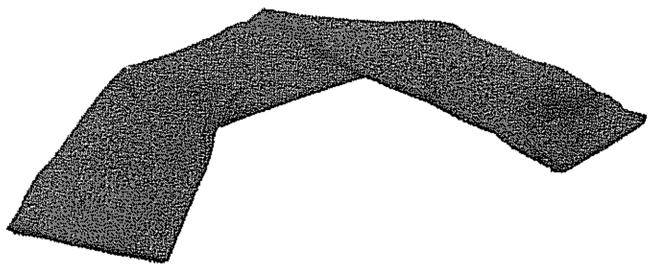

m
n
b
a
c
d
e
f
g
k
i
j
l
h


Grid holder
o
p
q

SERVICE MANUAL-UNIT

Set of Sterilizable Covers for BV25 C-arm

9807 602 00001



Washable and sterilizable covers.

File this sheet in the Service Documentation Set of BV25 system, under tab Accessories BV25.

IPC: Eindhoven

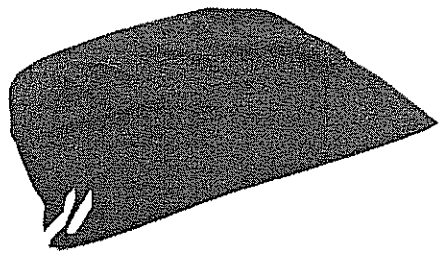
Printing instructions: 4522 983 13981

Printed in The Netherlands (85.0)

SERVICE MANUAL-UNIT

Set of Sterilizable Covers for BV25 I.I. Shield and Tank Unit

9807 601 90001



Washable and sterilizable covers.

File this sheet in the Service Documentation Set of BV25 system, under tab Accessories BV25.

IPC: Eindhoven

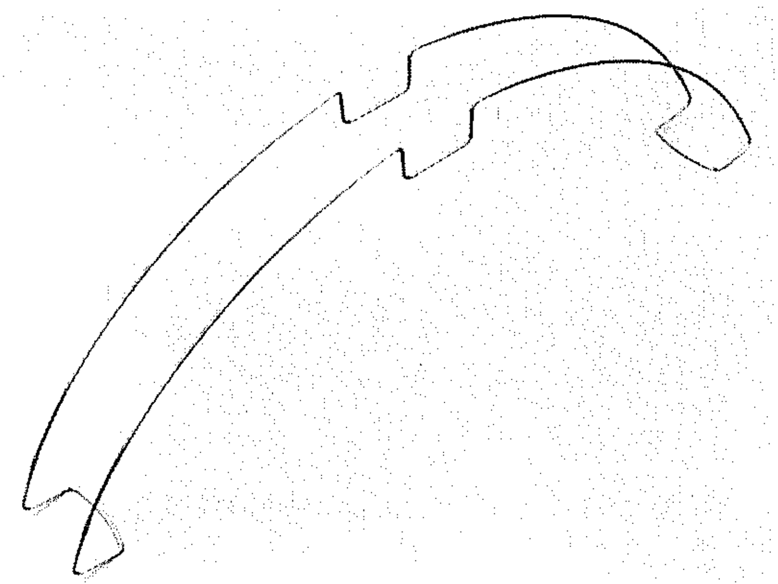
Printing instructions: 4522 983 13971

Printed in The Netherlands (85.0)

SERVICE MANUAL-UNIT

Springbow for BV25 C-arm

9807 602 10001



Springbow to cover BV25 C-arm.

File this sheet in the Service Documentation Set of BV25 system, under tab Accessories BV25.

IPC: Eindhoven

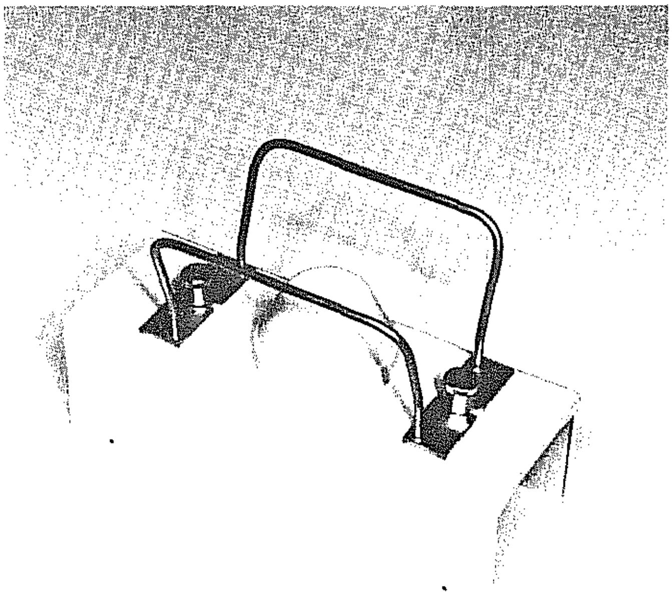
Printing instructions: 4522 983 13991

Printed in The Netherlands (85.0)

SERVICE MANUAL-UNIT

DIAPHRAGM COVER WITH SPACER FOR BV25

PEI 9807 602 80001



Diaphragm cover with spacer to be used on the BV25 Mobile Stand 9807 620 ....1.
The source-skin distance of the spacer is 25 cm.
File this sheet in service documentation set BV25 under tab accessories BV25.

The PEI contains:

- Diaphragm cover
- Detachable spacer
- Set of mounting material.

IPC: Eindhoven

Manual order number: 4522 983 17381

Printed in The Netherlands **(88.0)**

PHILIPS

Philips Medical Systems

parts list

Philips Medical Systems Nederland B.V. | Technical Service | Best

SERVICE PARTSLIST UNIT

PEI: 9807 602 80001

DESCRIPTION: SPACER FOR BV25 (25CM)

SERIAL NR:

List of pages and drawings

*printing instructions 4522 983 29421

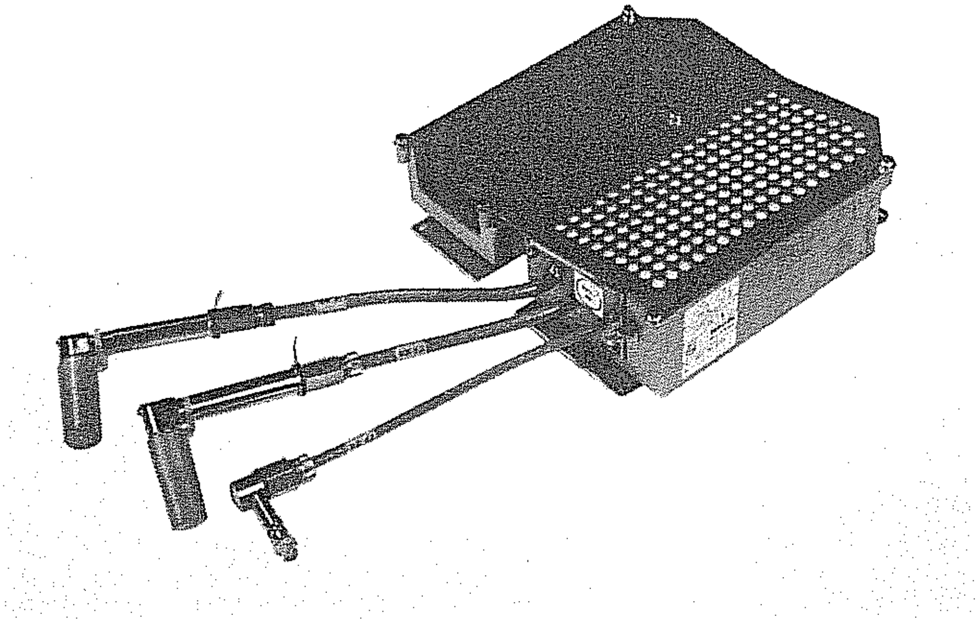
SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
		4522 126 56361	spacer	
		4522 126 50571	cover diaphragm HHS	
		4522 102 80082	countersunk washer M3	4x

SERVICE MANUAL-UNIT

6" I.I. Compact Generator

9807 140 20301

For serial numbers, see list of pages and drawings.



Application: This generator is suitable to supply the 6" S2 I.I. tube in the BV25.

IPC: EINDHOVEN

SERVICE MANUAL UNIT
6" I.I.COMPACT GENERATOR
TYPE NR: 9807 140 20301

SERIAL NR:

LIST OF PAGES AND DRAWINGS

PRINTING INSTRUCTIONS: 4522 983 14011

CONTENTS

ILLUSTRATIONS

1. INTRODUCTION AND TECHNICAL DATA

1.1. PURPOSE

The 6" I.I.Compact Generator has been developed to supply the 6" S2 I.I. tubes.

This High Voltage Cascade Generator provides:

- adjustable cathode voltage
- adjustable focusing voltage
- continuous ion pump voltage
- anode voltage (earth potential)

1.2. VERSIONS

9807 140 20301: For use with 6" I.I. tube in the BV25

1.3. ITEMS SUPPLIED

- 6" I.I.Compact Generator (See page 25)

1.4. EQUIPMENT IDENTIFICATION

The type number plate is located on the generator

1.5. TECHNICAL DATA

1.5.1. Dimensions and weights

Dimension : See dimension sketch on page 26
Weight : ~ 2.3 kg

1.5.2. Electrical Data

The high Voltage Cascade Generator comprises a 25 kHz oscillator for transforming a high voltage, which is followed by a 4.5 stage multiplier.
All H.V. output voltages are protected against overvoltage and overcurrent.
All H.V. output voltages are short circuit proof.

(1) Input Data

Supply Voltage : +15V±10%; -15V±10%
Current consumption : <250 mA

(2) Output data

Voltages		Min.	Max.
Cathode (adjustable)	Vc	-10 kV	-25 kV
Focusing (adjustable)	Vf	-9.76 kV	-24.8 kV
Range focusing	Vf	160 V	400 V
Anode		0 V	0 V
Ion pump		-2kV +15%	-2kV -15%

(3) General

Load current of cathode : Ic < 15 uA
Load current of focusing electrode: If < 15 uA
Load current of ion pump : Ip < 20 uA

(4) Control signals

The control signals are given with respect to the 0 V common of the ±15 V generator supply.
Signal level: according to 15V LOCMOS.

- Reset Input Signal
  Alarm Reset : ALRS - HC
  Level : +7.5 V < Vin < +15 V
  Input impedance: 10 kohm
  Reset time : tr > 200 ms
  Location : BGX1:B4

- Alarm Output Signal
  HV Generator Alarm: HVGAL - H
  Level : +11V < Vout < +15V
  Output impedance : 10 kohm
  Alarm time : continuous
  Location : BGX1:B2

1.5.3. Environmental Data

Ambient temperature : +10°C to +55°C

1.5.4. Applicable Standards

- IEC 601-1; A.P.
- UL 187
- CSA c22.2 nr.114

2. INSTALLATION

2.1. INTRODUCTION

This section contains general mounting instructions. For information relating to the system, see the BV25 System Manual.

2.2. TOOLS AND TESTEQUIPMENT

This equipment can be installed with a standard toolset. Equipment needed during subsequent adjustment and functional testing is listed in paragraph 3,SETTING TO WORK.

2.3. INSTALLATION INSTRUCTIONS

2.3.1. Mechanical

Fit the unit with 4 screws M4 x 12 to the destinated mounting plate in the BV25 stand, see also the BV25 SYSTEM MANUAL.

2.3.2. Electrical

Remove the caps from the HV-plugs of the generator. Grease the HV-plugs with silicon grease, codenr. 1312 501 48202, and connect the plugs to the II-tube according Z1-1.

Cathode HVC11	BG:1	-	BBX1
Focusing HVF11	BG:2	-	BBX2
Ion Pump HVP11	BG:3	-	BBX4
Anode	BG		
Earth ( )	BG1		

CAUTION
HIGH VOLTAGE WILL BE PRESENT ON THE CONNECTORS WHEN THE LOW VOLTAGE SUPPLY IS SWITCHED-ON.

Connect the low voltage supply cable to the connector BGX1 of the compact generator.

Generator	Function
BGX1:A1	-15V supply
BGX1:A3,B3	0 V
BGX1:A5	+15V
BGX1:B2	High voltage alarm
BGX1:B4	Alarm reset

3. SETTING TO WORK

This section contains general adjustment and test data. For information relating to specific system configurations refer to the BV25 SYSTEM- and IMAGE Quality MANUAL.

3.2. EQUIPMENT REQUIRED

The tools and test equipment needed during adjustment and functional testing are:

- standard toolset
- multimeter (Ri > 10 Mohm)
- X-Ray photometer

3.3. SETTING UP AND TESTING

3.3.1. Adjusting the Cathode Voltage

Note :
Take measures for X-Ray protection before adjusting the cathode voltage. See BV25 System manual, section Corrective Maintenance.

The cathode voltage is factory adjusted and needs no adjustment.Only in case of reducing the intensification (Gx is dependent of the high voltage) the high voltage can be adjusted by means of BGR1, see page 25. The procedure for reducing the intensification (Gx) is described in the BV25 SYSTEM MANUAL.

Measuring point: MP2 - MP3

test voltage : $V_{MP_{2-3}} = \frac{Vc}{5000}$

3.3.2. Adjusting the Focusing Voltage

The focusing voltage of the I.I. tube can be adjusted by means of BGR2 (see page 25), until maximum sharpness is obtained. Adjustment can be made with an X-Ray photometer.

The procedure for focusing the I.I. tube is given in the service instructions of the relevant meter.

Measuring point: MP4 - MP1

Test voltage : $V_{MP_{4-1}} = \frac{3}{100} Vf$

3.4. FAULT INDICATOR BGH1

Location: See page 25
Function: Overvoltage (Vc) and overcurrent
Colour : Red

4. CORRECTIVE MAINTENANCE

See the instructions in the BV25 System Manual.

INHALT

ILLUSTRATION

1. EINLEITUNG & TECHNISCHE DATEN

1.1. VERWENDUNGSZWECK

Der 6" BV-Kompact Generator wurde fuer die Stromversorgung der 6" S2 Bildverstärkerröhren entwickelt.

Dieser Hochspannung Kaskaden Generator liefert:

- einstellbare Kathodenspannung
- einstellbare Fokussierspannung
- ständige Ionenpumpen-Spannung
- Anodenspannung (Erdpotential)

1.2. AUSFUEHRUNGEN

9807 140 20301: Für Anwendung mit 6" BV-Röhre im BV25

1.3. GELIEFERTE TEILE

- 6" BV-Kompact Generator (Siehe Blatt 25)

1.4. KENNZEICHNUNG DES GERAETS

Der Typennummerplatte ist auf dem Generatorgehäuse montiert.

1.5. TECHNISCHE DATEN

1.5.1. Abmessungen und Gewichte

- Abmessung: Siehe Maszskizze Blatt 26
- Gewicht : ~ 2,3 kg

1.5.2. Elektrische Daten

Der Hochspannung Kaskadengenerator enthält einen 25 kHz-Oszillator, der eine hohe Wechselspannung liefert, der eine 4,5 fache Vervielfacherstufe nachgeschaltet ist.
Die Hochspannungsausgangen sind gegen Ueberspannung und Ueberstrom gesichert.
Die Hochspannungsausgangen sind gegen Kurzschluss gesichert.

(1) Eingangsdaten

Speisespannung : +15V+10%; -15V+10%
Stromaufnahme : < 250 mA

(2) Ausgangsdaten

Spannungen	Minimal	Maximal
Kathode HVCL1 (einstellbar)	-10 kV	-25kV
Fokussierung HVFL1 (einstellbar)	-9,76 kV	-24,6 kV
Fokussierbereich Vf	160 V	400 V
Anode	0 V	0 V
Ionenpumpe	-2 kV+15%	-2kV-15%

(3) Allgemeines

Belastungsstrom der Kathode : Ic < 15 uA
Belastungsstrom der Fokussierungselektrode : If < 15 uA
Belastungsstrom der Ionenpumpe : Ip < 20 uA

(4) Steuersignale

Die Steuersignale sind in bezug auf die gemeinsamen 0V der Betriebsspannungen von + und -15V angegeben.
Signalpegel entspricht 15V LOCMOS.

- Rückstell-Eingangssignal
  Alarmrückstellung: ALRS - HC
  Pegel : $+7,5V<V_{in}<+15V$
  Eingangsimpedanz : 10 kOhm
  Rückstellzeit : t_r > 200 ms
  Punkt : BGX1:B4

- Alarm- Ausgangssignal
  Hochspannungsgenerator-Alarm: HVGAL - H
  Pegel : $+11V< V_{out}<+15V$
  Ausgangsimpedanz : 1 kOhm
  Alarmzeit : kontinuierlich
  Punkt : BGX1X1:B2

1.5.3. Umgebungsbedingungen

Temperaturbereich: +10° bis +55°C

1.5.4. Diesbezügliche Normen

- IEC 601-1; A.P.
- UL 187
- CSA c22.2 nr.114

2. MONTAGE

2.1. EINLEITUNG

Dieser Abschnitt enthält allgemeine Montageanweisungen. Für Angaben über die Montage des Subsystems siehe die entsprechende BV25 BV/TV- SYSTEM-ANLEITUNG.

2.2. WERKZEUG UND PRUEFGERAETE

Diese Einheit lässt sich mit normalem Werkzeug montieren. Die für die anschliessende Einstellung und die Funktionsprüfung benötigten Geräte sind in Punkt 3, "INBETRIEBNAHME", aufgeführt.

2.3. MONTAGEANWEISUNGEN

2.3.1. Mechanisch

Die Einheit mit vier Schrauben M4 x 12 an der betreffenden Montageplatte des BV25 Stativs anbringen, siehe auch die BV25 SYSTEM-ANLEITUNG.

2.3.2. Elektrisch

Entfern die Schutzkappe der Hochspannungssteckers. Fett die Hochspannungssteckers ein mit Silikonenfett, Kodenummer 1312 501 48202, und schliess die Steckers an der Bildverstakerröhre gemäss Z1-1.

Kathode	BG:1	-	BBX1
Fokussierung	BG:2	-	BBX2
Ionenpumpe	BG:3	-	BBX4
Anode	BG1		
Erde ( )	BG1		

WARNUNG
Sobald die Speisespannung angeschlossen und eingeschaltet wird ist HOCHSPANNUNG anwesend auf die Steckers.

Schliess die Speisespannungskabel an Konnektor BGX1 des Kompaktgenerators.

Generator	Funktion
BGX1:A1	-15V speisespannung
BGX1:A3,B3	0V
BGX1:A5	+15V speisespannung
BGX1:B2	Hochspannungsalarm
BGX1:B4	Alarmrückstellung

3. INBETRIEBNAHME

3.1. EINLEITUNG

Dieser Abschnitt enthält allgemeine Einstellungs- und Prüfdaten.
Für Angaben über die spezifischen Systemkonfigurationen siehe die entsprechende BV25 SYSTEM-ANLEITUNG

3.2. ERFORDERLICHE GERAETE

Für die Einstellung und für die Funktionsprüfung werden folgende Werkzeuge und Geräte benötigt:

- normales Werkzeug
- Vielfachmessgerät (Ri> 10 MOhm)
- Röntgenphotometer

3.3. AUFSTELLUNG UND PRUEFUNG

3.3.1. Einstellen der Kathodenspannung (HVC11)

Achtung :
Während Kalibrierung Strahlenschutz beachten. Siehe die BV25 System Anleitung unter "Korrektive Wartung".

Die Hochspannung und damit die Bildverstärkung (Gx) der Röhre lässt sich mit BC1R1 einstellen (siehe Blatt 25)
Die Kathodenspannung wurde in der Fabrik auf -25 kV eingestellt. Wie diese Bildverstärkung herabgesetzt werden kann, siehe die BV25 SYSTEM-ANLEITUNG.

Messpunkt : MP2 - MP3
Prüfspannung: $V_{MP_{2-3}} = \frac{Vc}{5000}$

3.3.2. Einstellen der Fokussierspannung HVF11

Die Fokussierspannung der Bildverstärkerröhre lässt sich mit BC1R2 (siehe Blatt 25) einstellen, bis die maximale Schärfe erreicht ist. Die Einstellung kann mit einem Röntgenphotometer erfolgt werden.

Wie die Bildverstärkerröhre fokussiert wird, ist in der Service-Anleitung des betreffenden Instruments angegeben.

Messpunkt : MP4 - MP1
Prüfspannung: $V_{MP_{4-1}} = \frac{3}{100}$ Vf

3.4. SERVICE-INDIKATOREN

3.4.1. Fehlerindikator BGH1

Lage : Siehe Blatt 25.
Funktion: Ueberspannung (Vc) und Ueberstrom.
Farbe : Rot.

4. KORREKTIVE WARTUNG

Siehe die Anweisungen in der BV25 SYSTEM-ANLEITUNG.

TABLE DES MATIERES

ILLUSTRATIONS

1. INTRODUCTION ET CARACTERISTIQUES TECHNIQUES

1.1. BUT

Le générateur compact de 6" A.L. doit assurer l'alimentation des tubes A.L.de 6" S2 .

Ce générateur en cascade àhaute tension fournit:
- une tension cathodique réglable.
- une tension de mise au point réglable.
- une tension continue destinée à la plompe à iones.
- la tension anodique (potentiel de terre).

1.2. VERSIONS

9807 140 20301: Pour application avec le tube amplificateur de luminance de 6" de BV25.

1.3. ELEMENTS FOURNIS

- Le générateur compact de 6"A.L.Voir page 25.

1.4. IDENTIFICATION DE L'EQUIPEMENT

La place de la plaque portant le numéro de type est trouvé sur le générateur.

1.5. DONNEES TECHNIQUES

1.5.1. Dimensions et poids

Dimension : Voir le croquis dans la page 26
Poid : ~ 2,3 kg

1.5.2. Donnees electriques

Le générateur en cascade à haute tension se compose d'un oscillateur de 25 kHz en vue de la transformation d'une haute tension. L'oscillateur est suivi d'un multiplicateur à étage 4,5.
Toutes les tensions de sortie H.T. sont protégées de *manière à rendre* impossibles les surtensions et les intensités de courant excessives.
Toutes les tensions de *sortie H.T. sont protégées* contre les courts-circuits.

(1) Données d'Entree

Tension d'alimentation : +15V±10%;-15V±10%
Consommation de courant: < 250 uA

(2) Données de sortie

Tensions	Mini	Maxi
Cathode (réglable) Vc	-10 kV	-25 kV
Mise au point (*réglable*) *Vf*	-9,76kV	-24,8kV
Mise au point de plage Vf	160 V	400 V
Anode	0 V	0 V
Pompe à ions	-2kV +15%	-2kV -15%

(3) Généralités

Courant de charge de la cathode : Ic < 15 uA
Courant de charge de la électrode *de concentration* : If < 15 uA
Courant de charge de la pompe à ions : Ip < 20 uA

(4) Signaux de Commande

Les signaux de commande sont donnés par rapport à ligne commune de 0V de la tension *d'alimentation* du générateur de +15V.
Niveau du signal: selon 15V LOCMOS.

- Remise à Zéro du signal d'Entree
  Remise à Zéro du signal d'alarme: ALRS - HC
  Niveau : $+7,5V < V_{entrée} < +15V$
  Impédance d'entrée : 10 kOhm
  Temps de remise à zéro : $t_r > 200$ ms
  Localisation : BGX1:B4

- Signal d'Alarme de sortie
  Alarme du générateur de haute tension: HVGAL - H
  Niveau : $+11V < V_{sortie} < +15V$
  Impédance de sortie : 1 kOhm
  Durée d'alarme : continue
  Localisation : BGX1:B2

1.5.3. *Conditions Ambiantes*

Température ambiante: +10°C à +55°C

1.5.4. *Normes Applicables*

- IEC 601-1; A.P.
- UL 187
- CSA c22.2 nr.114

2. *INSTALLATION*

2.1. *INTRODUCTION*

La présente section *contient des instructions* de montage globales. Pour l'information se rapportant au système à installer, voir *le MANUEL* correspondant du SYSTEME de BV25.

2.2. OUTILLAGE ET EQUIPEMENT DE TEST

L'équipement peut être installé à l'aide d'une trousse d'outils standard. L'équipement requis *pendant* le réglage suivant l'installation et pendant les tests fonctionnels est passé en revue à le point 3: *MISE EN SERVICE*

2.3. INSTRUCTIONS D'INSTALLATION

2.3.1. Mécanique

Fixer la unité dans le support de BV25, à l'aide de 4 vis M4 x 12 sur la plaque de montage réservée à cet effet,voir aussi le MANUEL du SYSTEME de BV25.

2.3.2. Electrique

Eloigner *les coquilles* de les fiches de haute tension du générateur. Graisser les fiches de haute tension *avec graisse de silicone,numéro* du code 1312 501 48202 et connecter les fiches au tube A.L. conforme Z1-1.

Cathode HVC11	BG:1	-	BBX1
Mise au point HVF11	BG:2	-	BBX2
Pompe à ions HVP11	BG:3	-	BBX4
Anode	BG1		
Terre ( )	BG1		

AVERTISSEMENT
HAUTE *TENSION EST PRESENT AUSSITOT LA TENSION* D'ALIMENTATION EST MIS.

Connecter le cable de la tension d'alimentation au connecteur BGX1 du générateur.

Générateur	Fonction
BGX1:A1	-15V
BGX1:A3,B3	0 V
BGX1:A5	+15V
BGX1:B2	Signal d'alarme de Sortie
BGX1:B4	Remise du signal d'alarme

3. MISE EN SERVICE

3.1. INTRODUCTION

La présente section contient des données globales relatives aux réglages et tests.
Pour l'information se rapportant à un configuration spécifique, il convient de consulter le MANUEL du SYSTEME de BV25.

3.2. EQUIPEMENT REQUIS

Les outils et l'équipement de test nécessaires pendant les réglages et les tests fonctionnels se présentent comme suit:

- trousse d'outils standard
- multimètre (Ri>10MOhm)
- photomètre radiologique

3.3. MISE EN PLACE ET TEST

3.3.1. Réglage de la tension cathodique HVC11

Remarque :
Penser aux protection du faisceau radiogène pendant l'ajustage de la tension de focalasition. Voir les instructions de la Système de BV25, Section Maintenance Corrective.

La haute tension du tube A.L. et partant le niveau d'amplification (Gx) du tube A.L. est susceptible d'être réglée à l'aide de BGR1, voir page 25
La tension cathodique est préréglée à l'usine sur -25 kV.
La procédure pour la réduction de l'amplification (Gx) est décrite au MANUEL du SYSTEME de BV25.

Point de mesure: MP2 - MP3
Tension de test: $V_{MP_{2-3}} = \frac{Vc}{5000}$

3.3.2. Réglage de la tension de mise au point HVF11

La tension de mise au point du tube A.L. peut être réglée à l'aide de BGR2, voir page 25.
Le réglage doit être pour suivi jusqu'à obtention de la netteté maximale.
Le réglage peut être effectué à l'aide d'un photomètre radiologique .

La procédure pour la mise au point du tube A.L. est continue dans les instructions de service formulées pour l'apareil de mesure en question.

Point de mesure: MP4 - MP1
Tension de test: $V_{MP_{4-1}} = \frac{3}{100}$ Vf

3.4. INDICATEURS POUR LE SERVICE APRES-VENTE

3.4.1. Indicateur d'erreur BGH1

Localisation	: Voir page 25
Fonction	: Tension excessives (Vc) et intensités de courant excessives.
Couleur	: Rouge

4. MAINTENANCE CORRECTIVE

Voir les instructions du MANUEL de SYSTEME de BV25.

INDICE

ILLUSTRACIONES

1. INTRODUCCION Y DATOS TECNICOS

1.1. FINALIDAD

El generador compacto del tubo de II de 6" de ha sido desarrollada para alimentar el tubo de 6" de BV25.

Este generador en cascada de alta tensión ofrece:

- tensión catódica ajustable
- tensión de enfoque ajustable
- tensión continua de la bomba de iones
- tensión del ánodo (potencial de tierra)

1.2. VERSIONES

9807 140 20301: Para aplicación del tubo de 6"
de BV25.

1.3. COMPONENTES ENTREGADOS

- Generador Compacto del tubo de 6"(ver página 25)

1.4. IDENTIFICACION DEL EQUIPO

El emplazamiento de placa con el número de tipo puede verse en el generador.

1.5. DATOS TECNICOS

1.5.1. Dimensiones y Pesos

Dimensiones: Ver el dibujo dimensional, página 26.
Pesos : ~ 2,3 kg

1.5.2. Datos Electricos

El generador en cascada de alta tensión comprende un oscilador de 25 kHz para la transformacio'n de alta tensión, que es seguido por un multiplicador de 4,5 etapas.
Todas las tensiones de salida de alta tensión están protegidas contra sobretensión y sobrecorriente.
Todas las tensiones de salida de alta tensión están protegidas contra cortocircuito.

(1) Datos de entrada
Tensión de alimentación:+15V±10%;-15V±10%
Consumo de corriente : < 250 mA

(2) Datos de salida

Tensiones	Min.	Máx.
Catódica (ajustable)Vc	-10 kV	-25 kV
Enfoque (ajustable)Vf	-9,76 kV	-24,8 kV
Enfoque de alcance Vf	160 V	400 V
anodo	0 V	0 V
Bomba de iones	-2 kV +15%	-2 kV -15%

(3) Generalidades

Corriente de carga de catódica : < 15 uA
Corriente de carga de électrode enfoque : < 15 uA
Corriente de carga de bomba de iones : < 20 uA

(4) Señales de control

Las señales de control se dan respecto a 0 V común de los generadores de alimentación de ± 15 V.
Nivel de señal: según 15 V LOCMOS.

- Reajuste de la señal de entrada
  - Reajuste de alarma : ALRS - HC
  - Nivel : +7,5V < Vin < +15V
  - Impedancia de entrada : 10 kOhm
  - Tiempo de reajuste : t_r > 200 ms
  - Emplazamiento : BGX1:B4
- Señal de salida de alarma
  - Alarma del generador de alta tensión:HVGAL-H
  - Nivel : +11V < Vout < +15V
  - Impedancia de salida : 1 kOhm
  - Tiempo de alarma : continuo
  - Emplazamiento : BGX1:B2

1.5.3. Datos Ambientales

Temperatura ambiente : +10°C hasta +55°C

1.5.4. Normas Aplicables

- IEC 601-1; A.P.
- UL 187
- CSA c22.2 nr.114

2. INSTALACION

2.1. INTRODUCCION

Esta sección contiene instrucciones generales para el montaje. Para información relativa al sistema especifico a instalar, ver el MANUEL correspondiente al SISTEMA de BV25.

2.2. HERRAMIENTAS Y EQUIPO DE PRUEBA

Este equipo puede instalarse con un juego de herramientas ordinario. El equipo necesario durante los ajuste subsiguientes y pruebas de functionamiento están enumerados en la punto 3: PUESTA EN FUNCTIONAMIENTO.

2.3. INSTRUCCIONES PARA LA INSTALACION

2.3.1. Mecánico

Fijar la unidad con 4 tornillos M4 x 12 a la placa de montaje del trípode metálico de BV25 destinada para ello, también ver le MANUEL del SISTEMA de BV25.

2.3.2. Elétrico

Alejar las fundas de los conectores de alta tensión. Engrase los conectores de alta tensión con la grasa de silicone,numéro del codigo 1312 501 48202 y conectar los conectores en el tubo I.I.conforme a ZI-I.

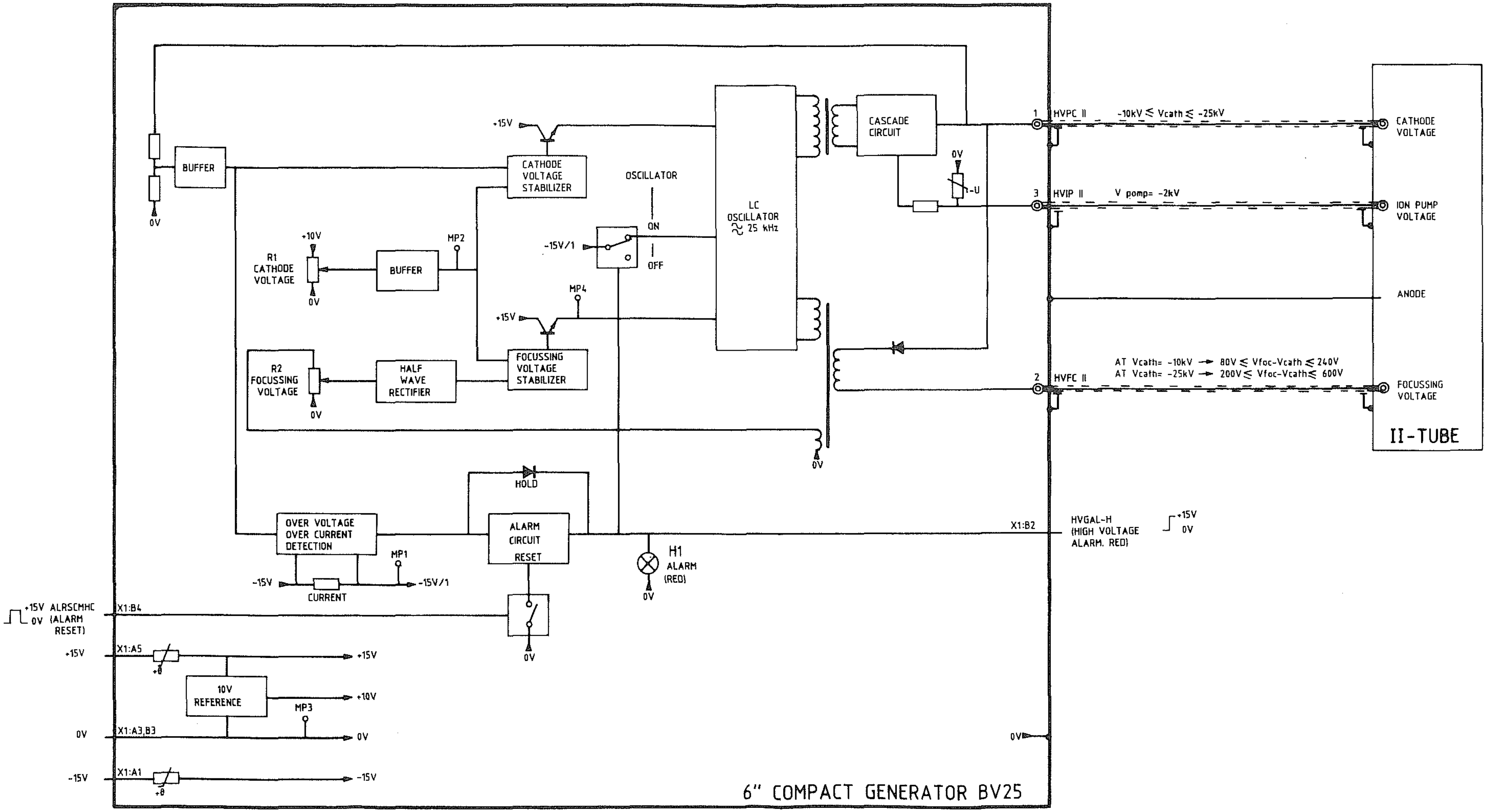
Cátodo HVC11	BG:1	-	BBX1
Enfoque HVF11	BG:2	-	BBX2
Bombadeiones HVP11	BG:3	-	BBX3
Anodo	BG1		
Tierra	BG1		

AVISO

En cuanto l'alimentación se conectara, la alta tensión hallarse existente sobre los conectores de alta tensión.

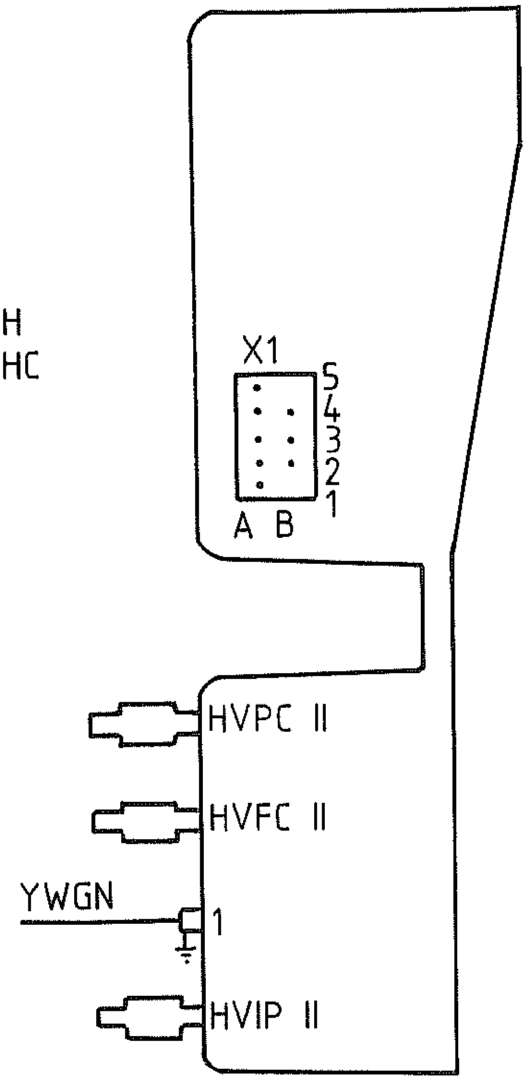
Conectar el cable d'alimentación en el conector BGX1 del generador compacto.

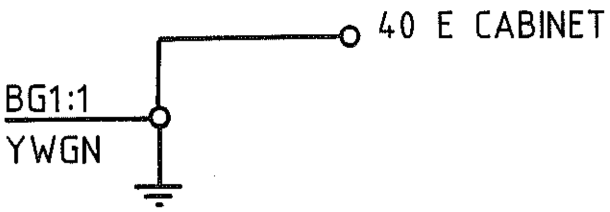
Generador	Función
BGX1:A1	-15V
BGX1:A3,B3	0V
BGX1:A5	+15V
BGX1:B2	Señal de alarma
BGX1:B4	Reajuste de alarma

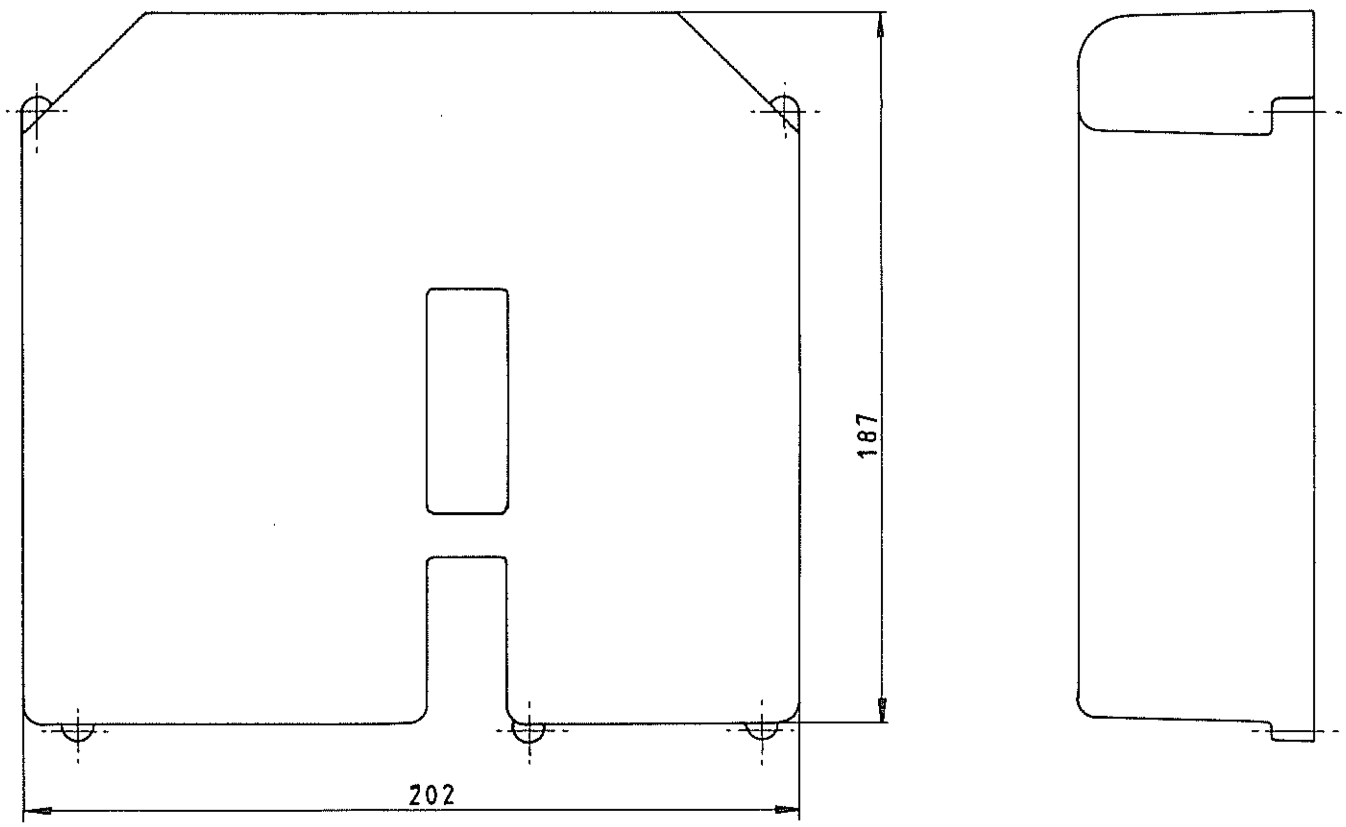


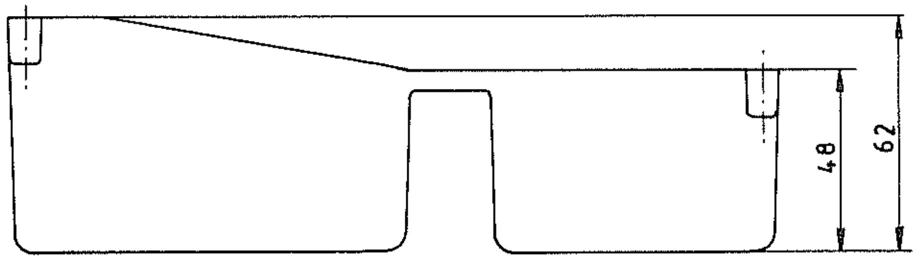
6" COMPACT GENERATOR BV25

X1:A1 → −15V
X1:A3.B3 → 0V
X1:A5 → +15V
X1:B2 → HVGAL-H
X1:B4 → ALRSCMHC









Dimensions in mm
(Scale 1:2)

Philips Medical Systems

parts list

Philips Medical Systems Nederland B.V. | Technical Service | Best

SERVICE PARTSLIST UNIT

PEI: 9807 140 20.01

DESCRIPTION: HT cascade gen. for 15cm II.

SERIAL NR:

List of pages and drawings

*printing instructions 4522 983 27491

SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
Z3.1	BG1	4522 103 24424	comp. 6" casc. generator	
Z3.1	BG1A1	9334 643 70682	IC Volt ref.	AD581J

SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
Z2.1	BG1X1/BG2X2	2422 034 11976	ModV contact	18x
Z2.1	BG1X1/BG2X2	2422 025 02198	connector housing ModV	2x5p 2x
Z2.1	BG2X1	2422 034 11976	ModV contact	5x
Z2.1	BG2X1	2422 025 01611	MODV connector hous. 2x4p	
Z2.1	BGX1	2422 015 12247	pincontact 0,14	3x
Z2.1	BGX1	2422 015 12272	pincontact 0,5	2x
Z2.1	BGX1-BGX2	4512 101 48002	pinconnector housing	10p 2x
Z2.1	BGX3	4522 103 24301	connector 25KV	
Z2.1	BGZ1	2722 171 03024	power supply 15V 0,5A	PM396D
Z3.1	BG1	4522 103 24424	compact 6"casc. generator	
Z3.1	BG1A1	9334 643 70682	IC volt ref.	AD581J
Z3.2	BG2	4522 107 75902	interface 6" generator	

SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
Z2.2	BG1X1	2522 034 11976	MODV contact	2x
Z2.2	BG1X1	2422 025 02198	connector housing MODV	10p
Z2.2	BG200	4512 916 50965	connection strip	2x
Z2.2	BG200	4512 126 25581	term. block 28p	
Z2.2	BGZ1	2722 171 03024	power supply 15V 0,5A	PM369D
Z3.1	BG1	4522 103 24424	compact 6" cascade gen.	
Z3.1	BG1A1	9334 643 70682	IC volt ref.	AD581J

SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
		4522 103 74904	cable assy	
		1312 501 48202	silicone paste	

3. PUESTA EN FUNCIONAMIENTO

3.1. INTRODUCCION

Esta sección contiene datos generales sobre ajuste y prueba. Para información referente a las configuraciónes específicas del sistema, consultar el MANUEL DEL SISTEMA de BV25.

3.2. EQUIPO NECESARIO

Las herramientas y equipo de prueba necesarios durante el ajuste y pruebas de funcionamiento son:

- juego de herramientas standard
- multímetro (Ri > 10 MOhm)
- fotómetro de rayos X

3.3. MONTAJE Y PRUEBA

3.3.1. Ajuste de la tension del Catodo HVC11

Nota :
Pensar en la protección del haz de rayos X durante de adjuste de la tensión de focalización.
Consulte el manual para de la Sistema de BV25, ver capitulo MANTENIMIENTO DE CORRECCION.

La alta tensión del tubo I.I. y, por consiguiente, la intensificación (Gx) del tubo I.I.puede ajustarse mediante BGR1 (ver página 25).La tensión del cátodo viene ajustada de fábrica a -25 kV.
El procedimiento para reducir la intensificación(Gx) se describe en el MANUEL DEL SISTEMA de BV25.

Punto de medición: MP2 - MP3
Tensión de prueba: $V_{MP_{2-3}} = \frac{Vc}{5000}$

3.3.2. Ajuste de la tension de enfoque HVF11

La tensión de enfoque del tubo I.I. puede ajustarse mediante BGR2, (ver página 25), hasta que se obtenga el máximo de nitedez. El ajuste puede hacerse con un fotómetro de rayos X.
El procedimiento para enfocar el tubo I.I. se indica en las instrucciones de servicio del medidor en cuestión.

Punto de medición: MP4 - MP1
Tensión de prueba: $V_{MP_{4-1}} = \frac{3}{100}$ Vf

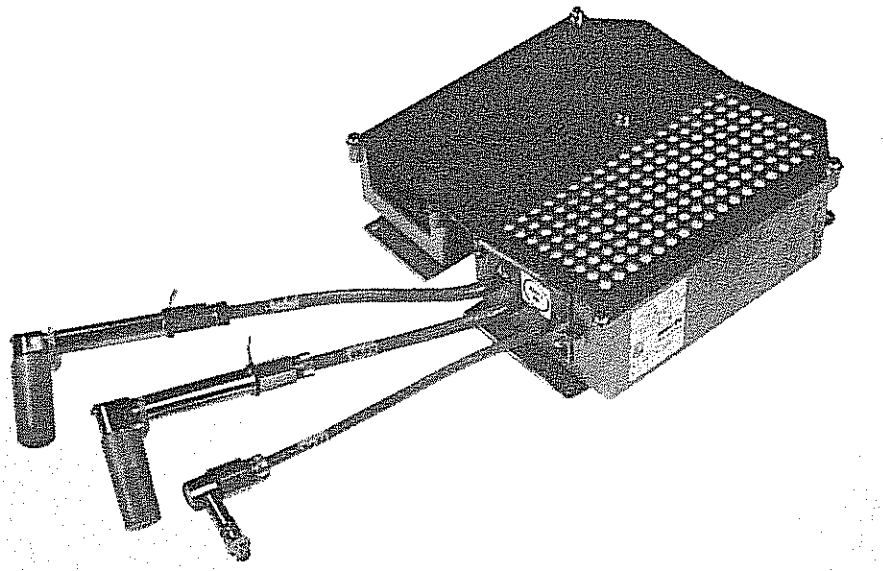
3.4. INDICADORES DE SERVICIO

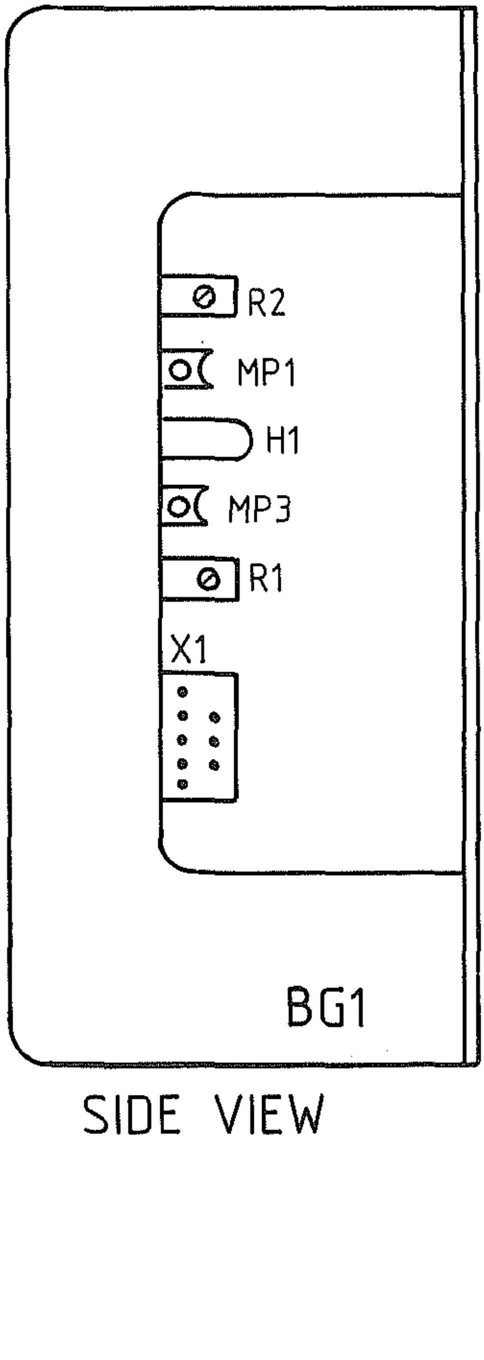
3.4.1. Indicador de Averia BGH1

Emplazamiento: Ver página 25.
Función : sobretensión (Vc) y sobrecorriente
Color : rojo

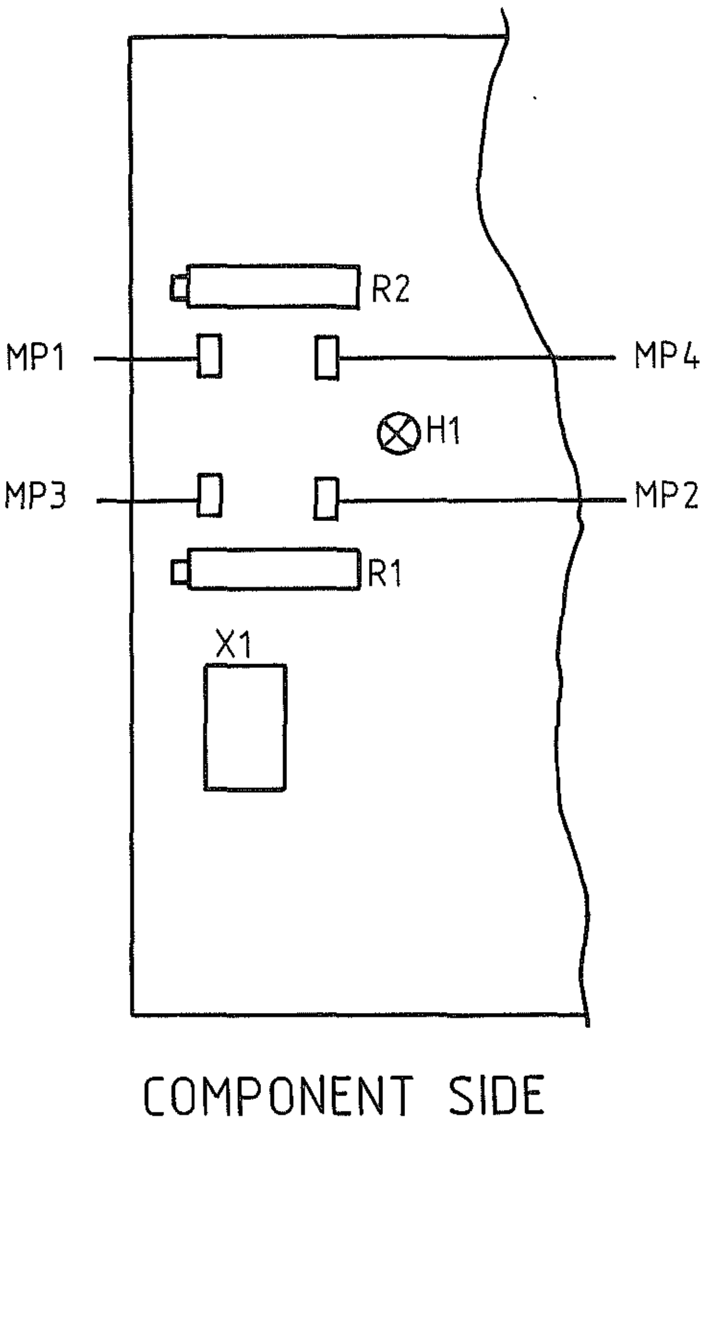
4. MANTENIMIENTO DE CORRECCION

Consultar por las instrucciones el MANUEL DEL SISTEMA de BV25





SIDE VIEW



COMPONENT SIDE

FILING INSTRUCTIONS

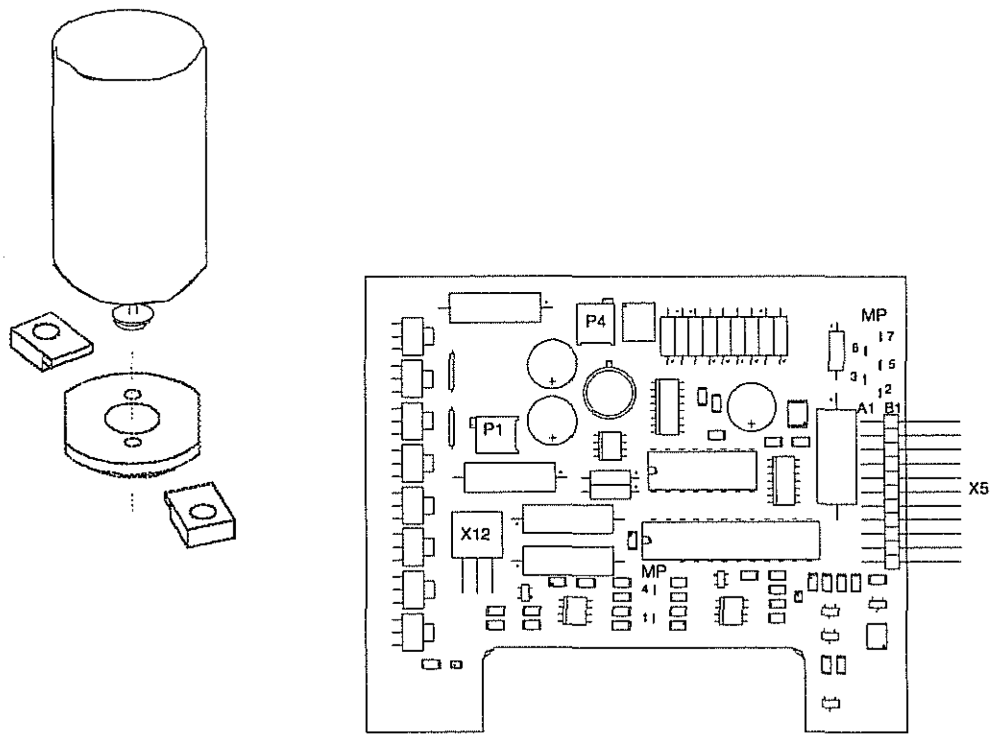
File this documentation in the IMAGE SUBSYSTEM binder.

SERVICE MANUAL - UNIT

Remote control irisdiaphragm

9896 010 02301

For serial numbers, see list of pages and drawings



This manual contains descriptive information on the equipment identified by the number stated above. For information on specific application, see the system manual.

PMSN Best

SERVICE MANUAL-UNIT
Remote control irisdiaphragm
TYPE NO. : 9896 010 02301

SERIAL NO. :

Manual codenumber : 4522 983 53521

List of Pages and Drawings

Contents

1. Introduction and technical data

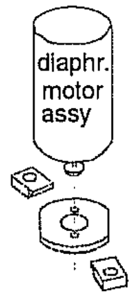
1.1. Purpose

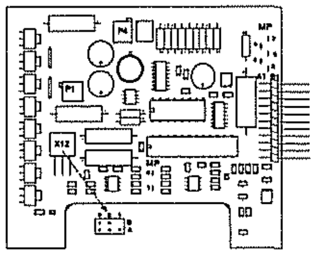
The Remote Control Irisdiaphragm for the XTV-8S camera (PEI number: 9896 010 02301) has been developed to control the iris aperture for fluoroscopy and for snapshot.

This option is already described in the XTV-8S service manual, so all relevant information can be found in that manual.

1.2. Described items

The PEI consists of:
- PCB WK6 [1]
- Iris motor [2]
- mounting material





WK 6 IRISDIAPHRAGM control

1.3. Tools

The Remote Control Irisdiaphragm can be installed/exchanged with the standard service tool set.

1.4. Applicable standards

PMS products are developed and manufactured with observance of a number of directives, regulations and standards. (e.g. International product safety standards as IEC, ISO, CISPR and national performance and product safety as 21CFR Subch. H and J, U.L., CSA, DIN and VDE.)
Information regarding the compliance status with standards and product approvals is obtainable at:

Philips Medical Systems
Corporate Quality Department
Regulation and approbation Group
Building QM-118
P.O. Box 10,000
5680 DA BEST
The Netherlands

Fax. No.	:	31-40-762205/762420
Tel. No.	:	31-40-762408
Telex No.	:	35000 PHTC NL routing indicator XLQBUXA

2. Installation

In case of a surgery stand the option is factory assembled. No mechanical and or electrical adjustments are necessary.

If the RC irisdiaphragm is not assembled then execute the following instructions:

Use the Z6-1 drawing of the XTV-8S service manual.

(1) disconnect the flex from WK1 (pull the connector towards you and turn it open)
(2) disconnect the flex from WK2 (pull the connector open), unscrew [1], and remove the slider
(3) move (with care) the top-plate with the flex out of the sliders
(4) remove the connections to the basic plate flex 2 x [9] and 1 x [4] remove the flex with the two flex plates (remove WK1 if necessary 3 x [3])
(5) remove the manual irisdiaphragm assy 2 x [7] and fix the motor assy (2 x [7]), connect the cable to WK1:X9
(6) remove 2 screws [5] from WK2 (fastened to the couple plate) and fix WK2 with the delivered screws [6], connect WK6 to WK2 and fix it with 2 x [5] and 1 x [4]
(7) place WK1 back to its place 3 x [3], place the flex with the two plates back to its place and fix the basic plate flex with 2 x [9] and 1 x [4]
(8) move the top plate such that the flex fits into the WK1 connector and lock it, mount the slider [1] back to its place, connect the other side of the flex to WK2 and lock it

3. Programmings

There are no jumpers or switches on the irisdiaphragm control board WK6.

4. Adjustments

The adjustments are described in the PEI manual (for RF/RC systems see also the subsystem manual).

Philips Medical Systems

PARTS LIST

Service

Description	: REM. CONTR. IRIS DIAPHRAGM XTV8S	**Ref. No.**	: 9896 010 02301
Publication No.	: 4522 983 33981	**Product Group**	: 744

LIST OF PAGES AND DRAWINGS

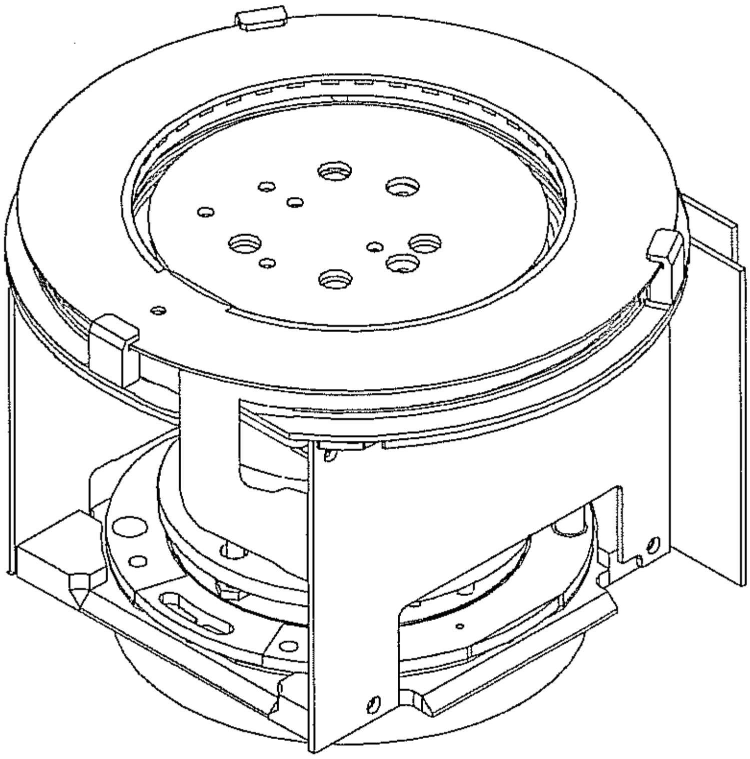
SCHEME/ PAGE 1	INDEX 2	CODENUMBER 3	DESCRIPTION 4	DATA 5
	WKM1	4522 161 75401	iris motor assy	
	WK6	4522 167 00091	rota iris XTV 8S board	

SERVICE MANUAL - UNIT

XTV-8S

9896 010 022$^{6}_{7}$.

For serial numbers, see list of pages and drawings



This manual contains descriptive information on the equipment identified by the number stated above. For information on specific application, see the system manual.

PMSN Best

SERVICE MANUAL-UNIT
XTV-8S camera
TYPE NO. : 9869 010 022$\frac{6}{7}$1

SERIAL NO.:

Manual codenumber: 4522 983 53501

LIST OF PAGES AND DRAWINGS

4522 983 53511					93-09-14	
1	5600	Page 1				A4

Section 1: Introduction & Technical Data

Contents

1. Purpose

The XTV-8S camera is a major upgrade of the first generation XTV-8 CCD camera. The XTV-8S camera is meant for standard class fluoroscopy examinations in conjunction with:
- 23 cm single channel, multi-mode Image Intensifier (for surgery and non-surgery stands)
- 15 cm single channel II (for surgery stands).

1.1. Definition of terms

The following terms/mnemonics are used in this manual:

ADC	Automatic Doserate Control
AGC	Automatic Gain Control
CCD	Charge Coupled Device
CCIR	European video standard
DRFLDNA	Doserate Fluoroscopy Differential Signal Negative Analog
DRFLDPA	Doserate Fluoroscopy Differential Signal Positive Analog
EIA	American video standard
II	Image Intensifier
MF	Measuring Field
RC	Remote Control stand
RF	Radiography Fluoroscopy stand
VIAGC	VIdeo after AGC
VIBS	VIdeo with Blanking and Sync. (= composite video out)
VICA	VIdeo from CAmera (without sync. before AGC/ADC)

1.2. Versions

The XTV-8S camera will be delivered in 2 versions. The differences between the versions are in the type of video produced.

XTV-8S/50	50 Hz camera	9896 010 02261
XTV-8S/60	60 Hz camera	9896 010 02271

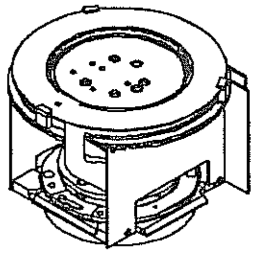
The 50 Hz version, produces an CCIR (625 lines interlaced) composite video output.
The 60 Hz version, produces an EIA (525 lines interlaced) composite video output.

Option	Irisdiaphragm Remote Control	9869 010 02301

Function: remote controled diaphragm for: - 1 fluoroscopy position
- 1 snapshot/boost position

1.3. Items supplied

- camera S version
- camera cable



1.4. Equipment identification

Equipment identification is located on the inside of the camera cap and on the central labelling station "I" of the stand.

NOTE

In case of replacement of the certifiable items, always replace the duplicate label on the places mentioned above.

---

2. Technical data

2.1. Performance data

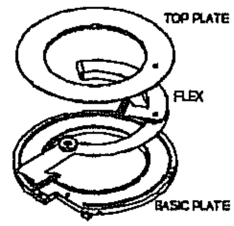
2.1.1. General

The XTV-8S has:
- very good resolution through: - a CCD with 750 horizontal pixels
  - optimal use of the CCD sensor area through elliptical projection
- good signal to noise ratio, minimum lag
- service adjustable irisdiaphragm with position detection
- service selectable sync. modes, X-tal/mains lock
- user selectable AGC gain modes; fixed, automatic and locked
- ADC and AGC based on pseudotop-detection in the measuring field
- fixed white compression
- circle blanking
- left/right image reversal (user selectable)
- horizontal contour enhancement
- cable-loss compensation
- very low sensitivity to EM-interference
- a low-energy stand-by mode to reduce the power consumption

The XTV-8S major components are:

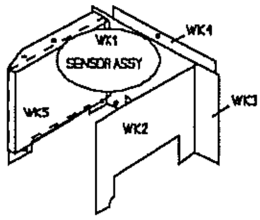
- **Flex with plates**

The flex is guided by a basic-plate and a top-plate.



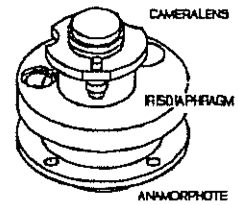
Printed Circuit Boards

WK1 preprocessing 1 (is part of the sensor assy)
WK2 preprocessing 2
WK3 AGC/ADC 1
WK4 AGC/ADC 2
WK5 videoprocessing



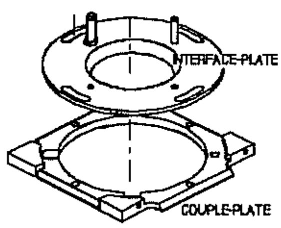
Integrated optics

Is made as one part and contents:
- cameralens
- anamorphotelens
- irisdiaphragm



Couple-plate

With this couple-plate the camera can be mounted directly on the basic lens with a quick locking device.
The Integrated optics are mounted with an interface-plate to the couple-plate.



See the Spare Parts list for a detailed replaceable-items guide of this camera.

2.1.2. Optics

Type	:	single channel tandem system with an adjustable irisdiaphragm and a prism pair (anamorphote) for vertical image compression
Anamorphote	:	vert : hor axis = 3 : 4
Cameralens	:	F 1.0/21
Diaphragm	:	irisdiaphragm, opening is service adjustable mechanically from 5 to 21.3 mm

2.1.3. CCD-imaging and preprocessing

Image sensor	:	ICX038ALA (EIA), ICX039ALA (CCIR)
Type	:	interline transfer CCD, single output register
Effective pixels	:	752 (H) x 582 (V) (CCIR), 768 (H) x 494 (V) (EIA)
Readout mode	:	interlaced, frame or field accumulation

2.1.4. Gain control

Gain modes	:	auto gain control (AGC) fixed gain AGC-lock
AGC	:	feedforward gain control TOP-2A detection
AGC range	:	0.2 - 8 x, nominal 2 x after stabilisation
Fixed gain range	:	0 - 4 x, nominal adjusted to 2 x
Measuring fields	:	circular (can be made visible on the image)

2.1.5. Automatic dose control

Detection	:	TOP-2
Measuring fields	:	same as gain control
Output signals	:	DRFLDFPA and DRFLDFNA - 7.5 to + 7.5 V for non-surgery stands (stabilization level = 0V) 0 to 9 V for surgery stands (stabilization level = 1.5V)
settings	:	there are 3 settings for operating point available (1 fixed and 2 adjustable)

2.1.6. Video output signal (VIBS)

Video standard	:	composite video EIA or CCIR
Output impedance	:	75 Ohm
Max. level	:	700 mV or 1100 mV (service selectable)
Sync. level	:	- 300 mV ± 30 mV
White compression	:	2 curves
Contour enhancement	:	horizontal, function can be set on/off
Video bandwidth	:	10 MHz
Cable loss compensation	:	DC and HF-roll off compensation
Sync. modes	:	X-tal/mains lock
Clean circle	:	can be switched off for service purposes

2.1.7. **Option Iriscontrol** (if present)

remote controled diaphragm for : 1 fluoroscopy position
1 snapshot/boost position (2.4 x area reduction).

2.2. Dimensions and weight

Dimensions : 95 x 140 x 150 mm (h x w x d)
Weight : 12 N.

2.3. Supply requirements

Supply voltages and power consumptions:

+ 15 V DC ± 1 V, max. 7.5 W
- 15 V DC ± 1 V, max. 7.5 W
+ 6.4 V DC + 0.2/- 0.6 V, max 6.5 W

2.4. Environmental data

Ambient temperture in operation : 0 to 40 C
Ambient temperture storage : - 25 to + 70 C
Relative humidity max. : 90 %

2.5. Compatibility

The XTV-8S camera is compatible with the following Philips made:

X-ray Generator	Monitor	Subsystem	Mobil surgery stand
SM MM MTM MCM MCRT MCP OM200 MC. /SC. SCP Optimus CP	20" family 17" family 15" family	Triple I 23 cm	BV 25 family

2.6. Applicable standards

PMS products are developed and manufactured with observance of a number of directives, regulations and standards. (e.g. International product safety standards as IEC, ISO, CISPR and national performance and product safety as 21CFR Subch. H and J, U.L., CSA, DIN and VDE.)
Information regarding the compliance status with standards and product approvals is obtainable at:

Philips Medical Systems
Corporate Quality Department
Regulation and approbation Group
Building QM-118
P.O. Box 10,000
5680 DA BEST
The Netherlands

Fax. No.	:	31-40-762205/762420
Tel. No.	:	31-40-762408
Telex No.	:	35000 PHTC NL routing indicator XLQBUXA

Section 2: Installation

Contents

1. Introduction

The camera is delivered in a factory assembled and adjusted -II/TV subsystem- and no mechanical or electrical adjustments are required in the field.
If a complete camera is exchanged then follow the adjustments given in the "what to do table" in section 6 of this manual. See also para. 1.4. section 1 of this manual.

Section 3: Fault Finding

Contents

1. Functional information

Location of the items mentioned in the tables of the PCB overview are given on the drawing Z3-1.

1.1. WK1 preprocessing 1 board

Item	Name	Function	Remarks
jumpers	-		
switches	-		
measuring points	-		
adjustments	R24 R28 R57 R58	+ 15 V V sub. cross talk compensation gain	NO service adjustment NO service adjustment NO service adjustment NO service adjustment

1.2. WK2 preprocessing 2 board

There are no jumpers, switches, measuring points or potentiometers on this board.

1.3. WK3 AGC/ADC 1 board

Item	Name	Function	Remarks
jumpers	W1 W2 W3 X19	blockgenerator 1-2 = on; 2-3 = off rampgenerator 1-2 = on; 2-3 = off videoproc. bypass 1-2 = on; 2-3 = off A-B 1 = 3.3 till 10 m A-B 2 = 10 till 16.7 m } cable A-B 3 = 16.7 till 25 m compensation other = 0 till 3.3 m	for surgery program always 0 till 3.3 m (A1-2 or A2-3)
switches	-		

Item	Name	Function	Remarks
measuring points	MP1	VIN (video in)	
	MP2	VINADJ (video in after first gain)	
	MP3	VIAGC (video after AGC)	
	MP4	VICOMP (video after white compression)	
	MP5	VIDAC (video from the videoproc.)	
	MP6	VICORR (video after contour correction)	
	MP7	VIBS (video out)	
	MP8	IRPOT 1 (irispotentiometer pin 1)	
	MP9	IRPOT 2 (irispotentiometer pin 2, slider)	
	MP10	IRPOT 3 (irispotentiometer pin 3)	
	MP11	video gainmult	
	MP12	video after divider	
	MP13	DRFLDPA (doserate fluoro	
	MP14	0 Volt	
	MP15	Vclamp	
adjustments	P1	amplitude blockgenerator	
	P2	doserate medium format	
	P3	doserate small format	
	P4	black level	
	P5	fixed gain	
	P6	AGC threshold small MF	
	P7	AGC threshold large MF	
	P8	offset	NO service adjustment

1.4. WK4 AGC/ADC 2 board

Item	Name	Function	Remarks
jumpers	W1	clean circle 1-2 = on; 2-3 = off	
switches	S1:1 S1:2 S1:3	on = surgery; off = RF/RC	
	S2:1	on = X-tal lock; off = mains lock	
	S2:2	on = contour correction on; off = cc off	
	S2:3	on = frame accumulation; off = field accumulation	
	S2:4	on = white compression curve 1; off = curve 2	
	S2:5	on = fixed gain on; off = normal use	
	S2:6	on = 1100mV max. VIBS level; off = 700 mV	monitor depended
	S3:1	on = normal image ; off = image horizontal inverted	
	S3:2	on = ISU 9807 519 10001; off = not used	
	S3:3	on = relative MF value ; off = absolute MF value	
	S3:4 S3:5	MF rel C0 MF rel C1	see the next table
	S3:6	on = MF remote selectable; off = MF local selectable	
	S3:7	on = large MF; off = small MF	only if S3:6 = off
	S3:8	on = AGC soft rise on; off = no AGC soft rise	

measuring points	MP1 MP2	ground ground	
adjustments	-		

NOTE

The MF or the service cross is only visible on the monitor if WK5:S2 is positioned to the right and WK4:W1 in 1-2 (CLCL off).

S3:3 (MF relative/absolute)	S3:4 (MF rel C0)	S3:5 (MF rel C1)	Operation
on	off	off	service cross
on	off	on	not used
on	on	off	MF for RF/RC
on	on	on	MF for BV25/26
off	don't care	don't care	MF for BV29

The large or small MF are selectable with S3:7 (if S3:6 is off). The MF values are given in % of the nominal clean circle size, see the next table. The MF values for BV29 are absolute, in this table they are converted in % of the nominal CLCL size.

		BV25/26	BV29
large MF	9" format	-	32
	7" format	-	44
	5" format	50	50
small MF	9" format	-	18
	7" format	-	25
	5" format	30	30
		[%]	[%]

1.5. WK5 videoprocessing board

Item	Name	Function	Remarks
switches	S1 S2	circle blanking size; from 0 till 7, with every step the circle size will increase with 8 lines. (from 8 till F is the same value as from 0 till 7) MF visible on image (only when clean circle is off) right position = on; left position = normal use	only when WK4:W1 = 2-3
measuring points	MP1	midline (sync. pulse on the middle of the video signal)	
adjustments	P1	video gain	

1.6. Option, WK6 Rotairis board

Only if option is present

Item	Name	Function	Remarks
jumpers	-		
switches	-		
measuring points	MP1 MP2 MP3 MP4 MP5 MP6 MP7	ground iris position difference iristarget watch dog rotation position difference rotation speed rotation movement enable	
adjustments	P1 P2 P3 P4	irisdiaphragm not used (removed) not used (removed) offset	 NO service adjustment

2. Explanations

2.1. The image projection

Function : accurate projection of the image from the II-output screen upon the image area of the CCD sensor.

Therefor three types of lenses are used:

- The basic lens (no part of the camera): collimates the image from the II-output into a parallel beam.
- The anamorphote lens: compresses (3/4) the image in the vertical direction (to use the complete image area of the CCD).
- The diaphragm: variates the light intensity.
- The camera lens: project the image on the image area of the CCD sensor.

2.2. Preprocessing 1 and 2

Function: transforming the projected image on the CCD sensor into a pre-amplified sync-less video signal.

The CCD convert the image projected on the sensor into an interlaced video signal. There are 2 video modes (both interlaced): frame accumulation (even line field + uneven line field = 1frame in 40ms) and field accumulation (readout of the complete image area of the CCD within 20ms).
Z1-1 gives a simplified diagram of the preprocessing. With on WK1 a 50/60 Hz pcb identification so no programming necessary. On WK2 the video signal will be clamped on the black CCD pixels. After clipping and blanking the video signal (VICA) goes on to the AGC/ADC PCB.

2.3. AGC/ADC 1 and 2

Function: produce an X-ray Doserate control signal for the X-ray generator (ADC) and analog processing of the video signal to optimize its amplitude range and frequency spectrum (AGC and white compression).

New in this camera is the doserate-adjustment for large format, VICA will be amplified with a fixed value (the value for BV29 is not the same as for BV26/25 and RF/RC). See Z1-2.
So the doserate for large format is only adjustable through varying the irisdiaphragm, set the doserate to the wanted value (see system manual for conditions), measure the doserate signal MP13 and adjust it (with the irisdiaphragm) to 1.5V in case of surgery and 0V for RF/RC stands. In case of RF/RC multi mode the doserate for the other formats can be adjusted (the irisdiaphragm is fixed now) through changing the amplification factor. Measure MP13 and adjust it with P2 and P3 (format depended) to 0V.

The ADC consists of a: top 2 detection (almost true top) of the video signal within the measuring field; sample /hold stores the video value until the next video line is measured; Amplifier with the output signal DRFLDF (stabilization level = 1.5V for surgery and 0V each format for RF/RC).

The AGC consists of a: top 2A detection (slow top integration); Sample/hold; Feed forward amplifier (1/x ampl. and a multiplier) AGC threshold adjustable for the two measuring fields (P6 and P7). Fixed gain adjustable (P5).
The white compression converts high (white) video signal to a level given in Fig.1 and Fig.2, see the next page. Because of the different application there are two curves. One for RF/RC systems and one for surgery systems.

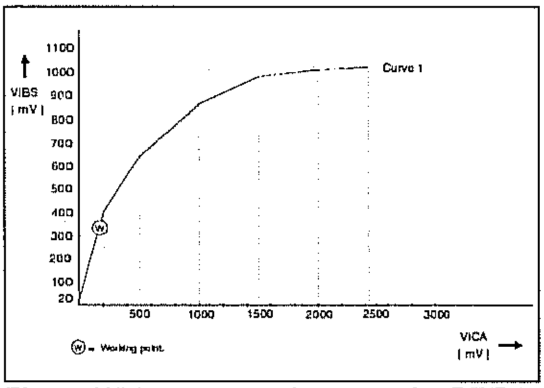


Fig. 1, White compression curve for RF/RC

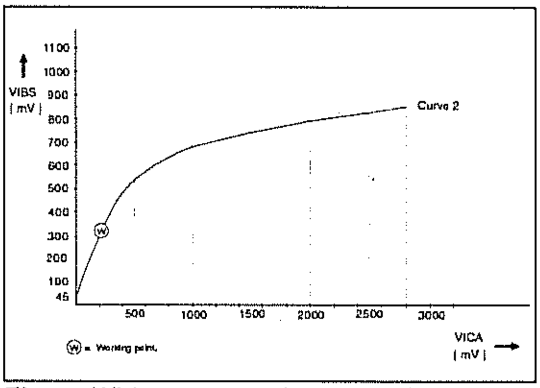


Fig. 2, White compression curve for surgery

The following items are located on the AGC/ADC 2 pcb:

- all the in/out-put signals from/to the stand
- almost all the switches
- supplies.

See Z1-2

2.4. Video processing

Function: The video processing compresses the image horizontally to get a normal circle shape.

The analog video will be converted to an 8 bit digital signal. Then the signal will be compressed via a buffer (written with 14 MHz readout with 19 MHz) and converted to an analog signal.
The circle generator delivers start/stop signals for: the circle blanking (adjustable with S1); the measuring fields and for the horizontal image reverse.

2.5. Video out

Function: makes video ready for use (monitor or video processing unit)

After the video processing (we are back on the AGC/ADC1 pcb) a contour correction is possible (can be programmed on WK4). The video signal will be clamped once more and a black level is added to the video signal (adjustable with P4).
When there are no exposures made and the fluoroscopy is switched off the camera is in the standby mode that means all voltages with the mnemonic sw (switched) are switched off. When fluoroscopy or exposure is enabled or the clean circle is switched off, the voltages are switched on again and within 20ms the clcldelayed switches over to normal video instead of setup clcl.
Then the circle blanking and the sync. will be added. The cable length compensation is only needed for RF/RC stands, for surgery the jumper must be set in a parking position.

2.6. Option, iris control

Function : to control the irisdiaphragm motor, the rotation function can not be used with this version

Is located on the rota-iris board WK6, see Z1-1.
The iris opening for fluoroscopy can be adjusted with P1. The other iris positions can be controlled by the stand. The iris control is the same as the rotation control. The iris motor and potentiometer are via WK1-flex-WK2-WK3 connected to WK6.

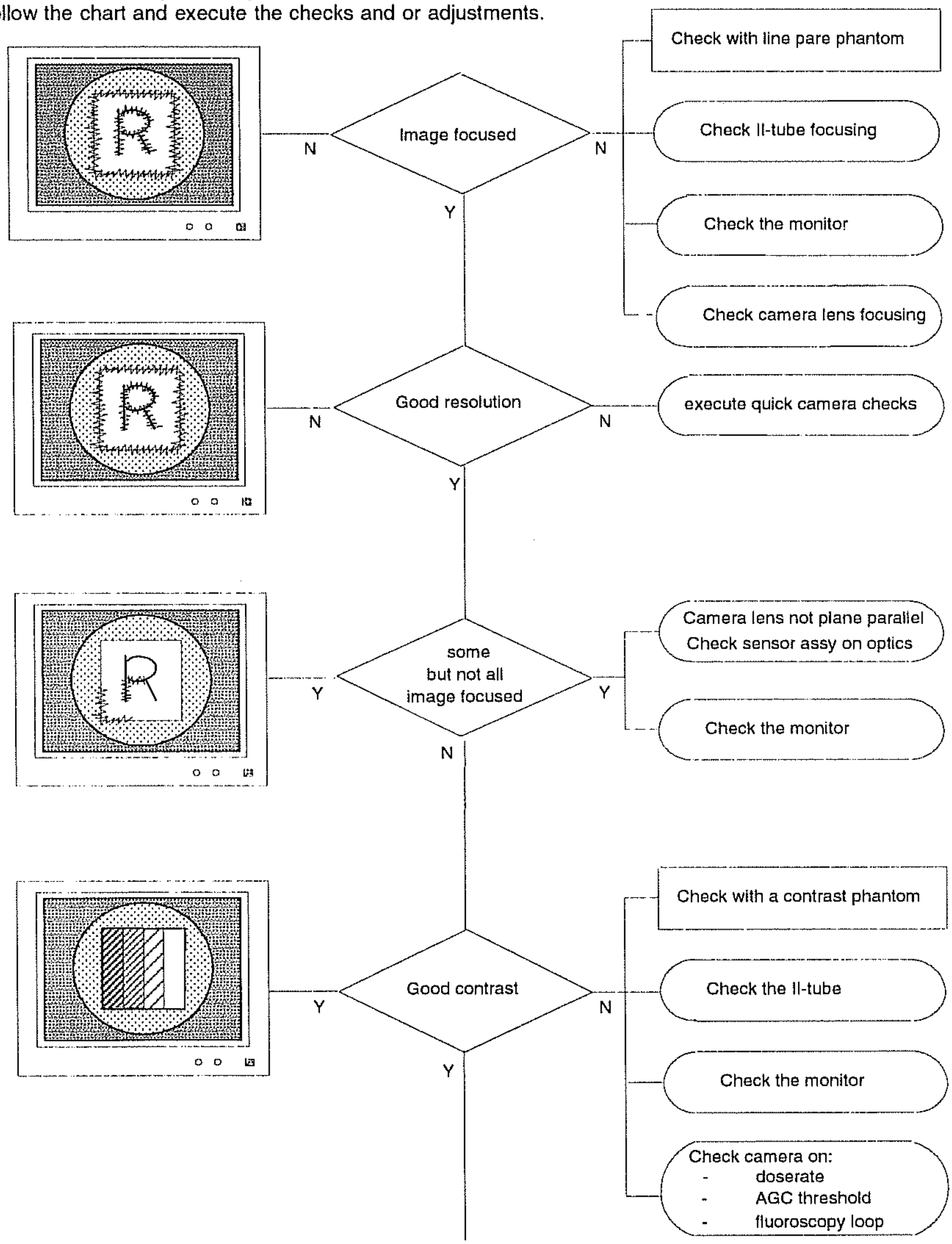
If this option is not present the irisdiaphragm can be mechanically adjusted. See Z6-1

2.7. Service aspects

The camera is equipped with two test generators. First the block generator WK3 (see Z1-2), with this generator the VICA signal can be simulated, however the amplitudes are not the same, the VICA value 200mV is with the block generator 250mV. This is caused by the noise on the VICA signal (the amplitude of the noise is doserate depended). When the block generator is adjusted to the right value, the video signals on every measuring point can be checked see Quick checks and Z1-3.
With the ramp generator the white compression curves; the contour correction and the max. video output can be checked.
The video processing board can be checked with the video bypass see quick checks.
The measuring field (large/small) can be made visible on the monitor.
Clean circle and fixed gain are service selectable.
A service cross can be made visible on the monitor for mechanical adjustments on the camera.
The camera can be checked on errors via the fault finding tree and via the quick checks.

3. Trouble shoot flow chart

This flow chart is a possible guide to trace a fault on pcb level
Follow the chart and execute the checks and or adjustments.



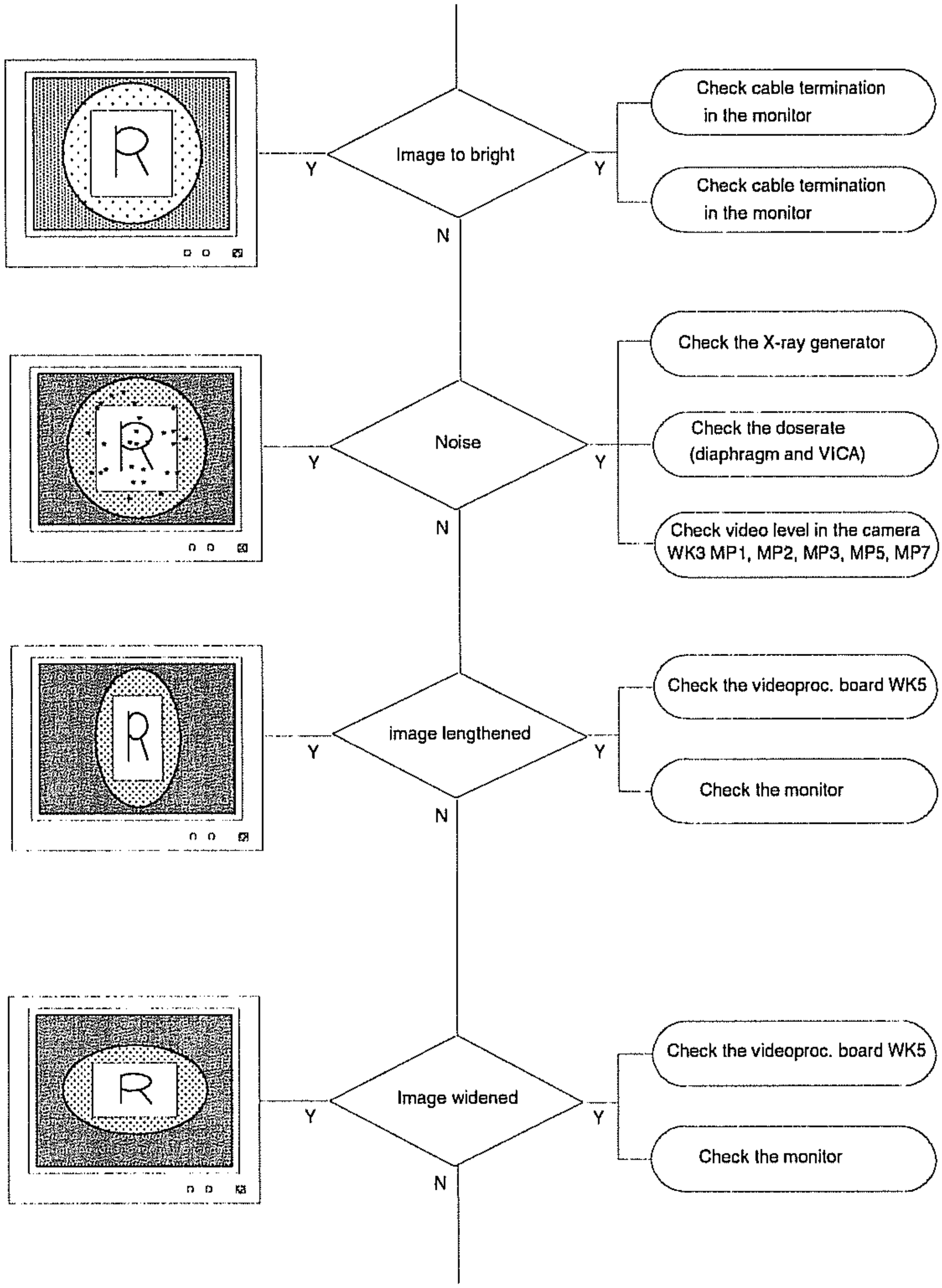
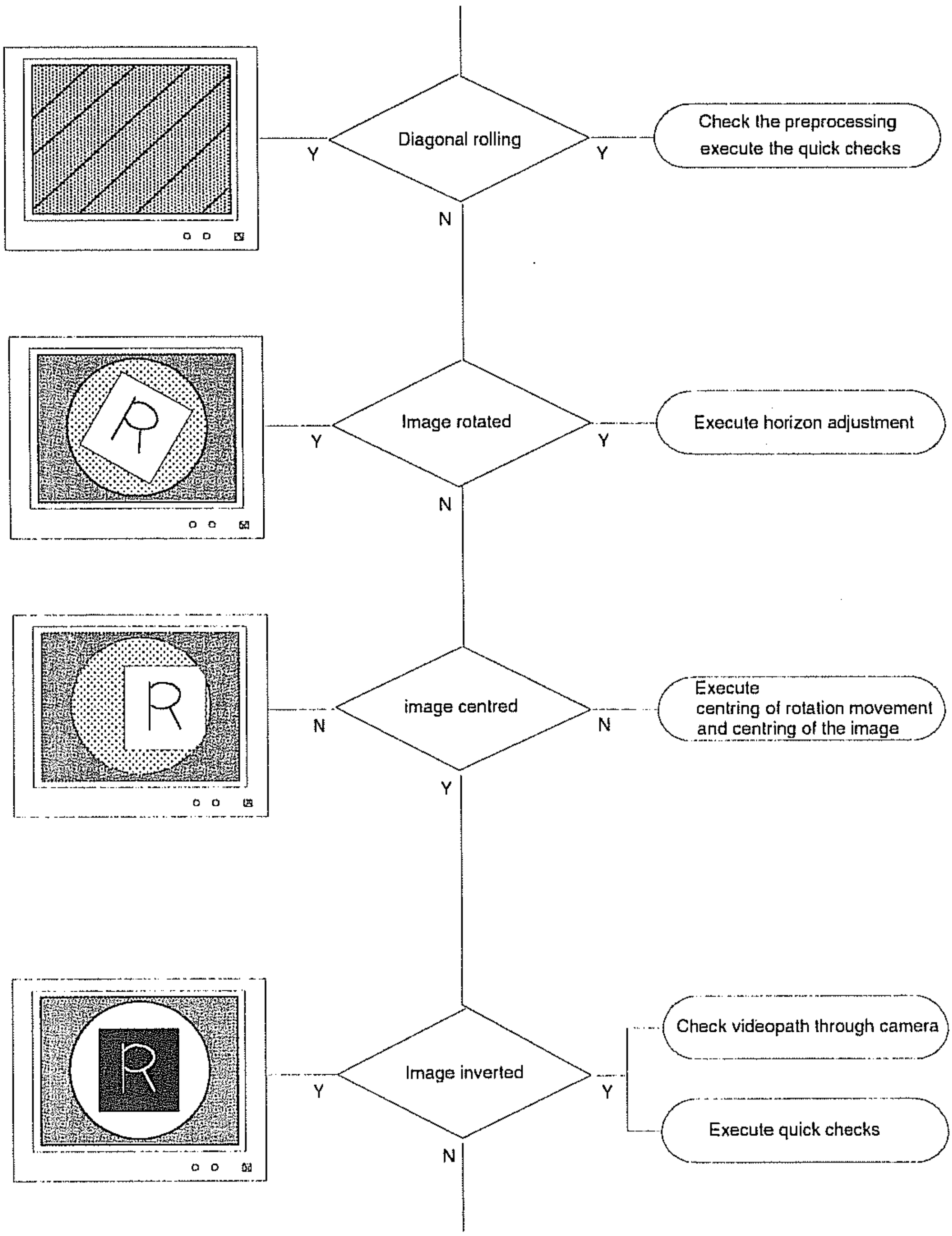
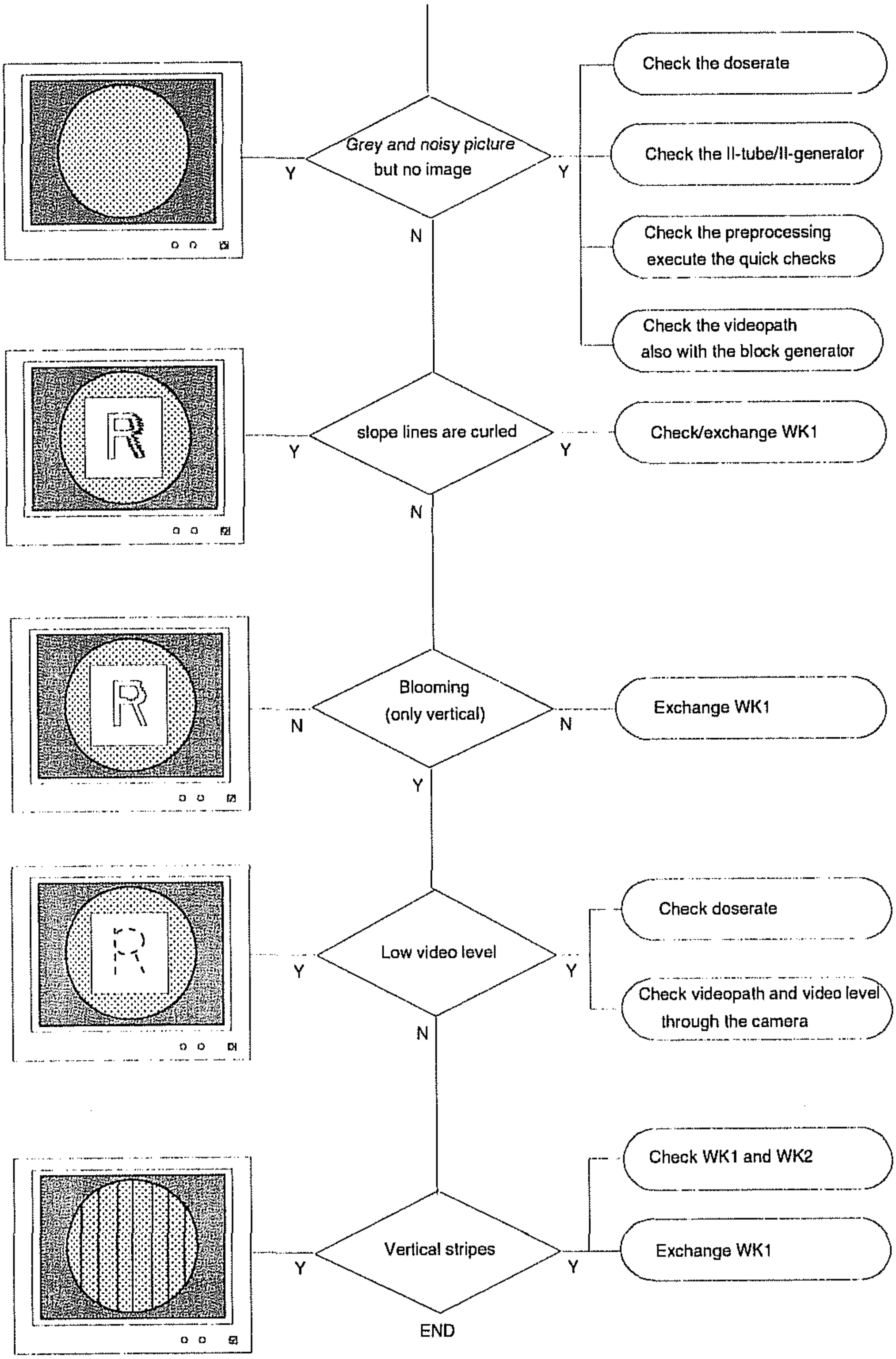


Image to bright
Y
Y
N
Check cable termination in the monitor
Check cable termination in the monitor
Noise
Y
Y
N
Check the X-ray generator
Check the doserate (diaphragm and VICA)
Check video level in the camera WK3 MP1, MP2, MP3, MP5, MP7
image lengthened
Y
Y
N
Check the videoproc. board WK5
Check the monitor
Image widened
Y
Y
N
Check the videoproc. board WK5
Check the monitor


Diagonal rolling
Y
Y
Check the preprocessing
execute the quick checks
N
Image rotated
Y
Y
Execute horizon adjustment
N
image centred
N
N
Execute
centring of rotation movement
and centring of the image
Y
Image inverted
Y
Y
Check videopath through camera
Execute quick checks
N


Grey and noisy picture but no image
Y
Y
N
Check the doserate
Check the II-tube/II-generator
Check the preprocessing execute the quick checks
Check the videopath also with the block generator
slope lines are curled
Y
Y
N
Check/exchange WK1
Blooming (only vertical)
N
N
Y
Exchange WK1
Low video level
Y
Y
N
Check doserate
Check videopath and video level through the camera
Vertical stripes
Y
Y
Check WK1 and WK2
Exchange WK1
END

4. Quick checks

4.1. Standard settings

See the hardware programmings in section 5 of this manual.

4.2. Supplies

Measure the DC voltages with a multimeter on WK3, (P = positive voltage, N = negative voltage).
Connect the 0 V of the multimeter on WK3 MP2 and measure the following voltages with a measuring pin:

- set WK3 W1:2-3 (clean circle off)

- + 6.4 V (+ 0.2 / - 0.6 V)
- + 15 V (± 0.1 V)
- - 15 V (± 0.1 V)

- + 5 Vsw
- + 10 Vsw
- - 10 Vsw

- set WK3 W1:1-2 (CLCL on)

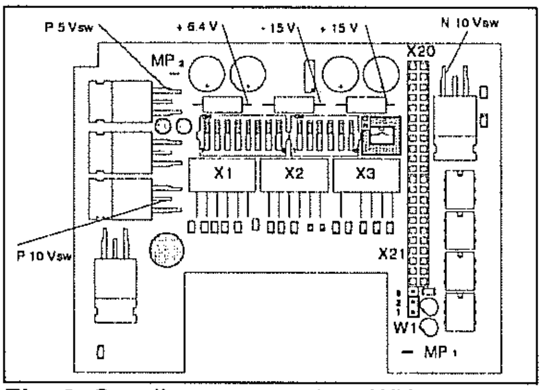


Fig. 3, Supplies measured on WK3

Measure also on the preprocessing 1 board WK1.
Be careful you have to measure on the SMD.

- Vsub (8V)
- P15V
- P10V
- N10V
- P5V

If one of the voltages are not correct or even not there then trace where the error appears and exchange the PCB.

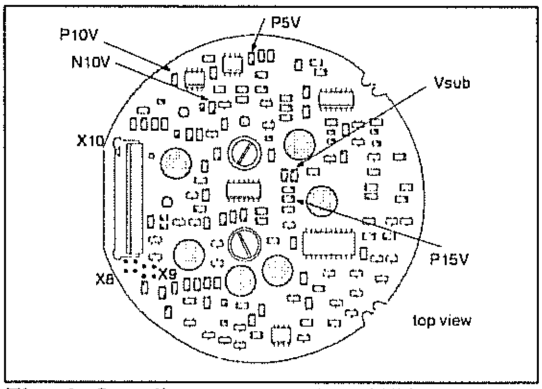


Fig. 4, Supplies measured on WK1

4.3. Dose control signal

- set WK3:W1 2-3 (clean circle off)
- measure with scope at WK3:MP7 (0 V = WK4:MP1 or MP2)
- adjust with WK3:P1 the block generator level to 250 mV
- measure with a multimeter the voltage on WK3:MP13, it must be 1.5 V ± 200 mV for surgery and 0V ± 200 mV for RF/RC stands
- remove jumper WK3:W1 (no video), the voltage must be 0 V ± 200 mV for surgery and - 7.5 V for RF/RC stands
- set jumper WK3:W1 in 2-3 (VICA)

4.4. Clean circle

- measure with a scope the VIBS signal, WK3:MP7, terminate with 75 Ω
- the clean circle must be 70 mV ± 5 mV
- the blanking level must be 0 V ± 50 mV
- the sync. level must be -300 mV ± 30 mV

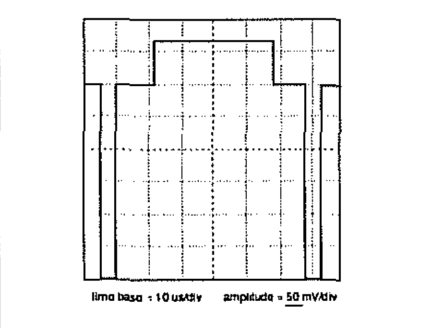


Fig. 5, Clean circle measured on VIBS

4.5. Video routing with the block generator

Set the block generator on (WK3 W1 in 1-2) and measure the video signal on WK3 MP1 and MP14 (0V). Adjust the block generator to 250mV. See diagram Z1-2 and measure the video signal on the given measuring points and compare it with the drawn signals (no. 1 until 9) on the diagram.
Set WK3 W1 back to 2-3 when finished with the measurements.

4.6. Video routing with the ramp generator

Set WK3:W2 in 1-2 (ramp gen. on). See diagram Z1-2 and measure the video signal on the given measuring points and compare it with the drawn signals (no. 10 until 17) on the diagram. The amplitude is depended on the programmed white compression curve, WK4 S2:4 on = curve 1 (lower amplitude) S2:4 off = curve 2 (higher amplitude). Check first the adjusted video gain (WK5 P1): set WK4 S2:4 measure the video signal on WK3 MP7 VIBS and check if the max. video is 1100 mV if not execute all the electrical adjustments (section 6). Fig 5 and 6 gives the two curves measured on VIBS WK3 MP7 with the ramp generator on.

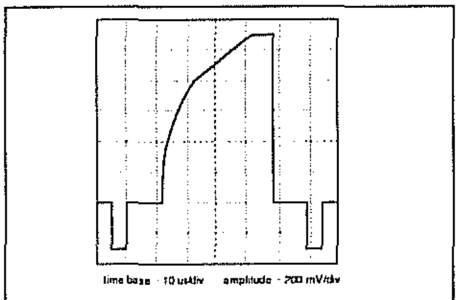


Fig. 6, white compression curve 2

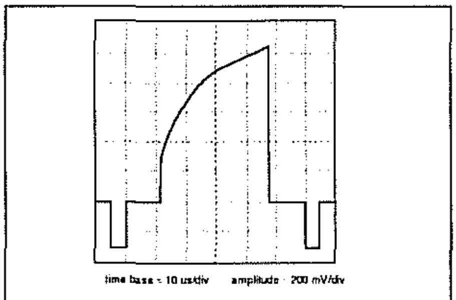


Fig. 7, white compression curve 1

The contour correction is visible on the video signal on MP6 of WK3
Set WK4:S2-2 on (cont. correction on)
Measure with scope on WK3:MP6 (VICORR), see Figure 3,
A must be between 0.5X and X.

Set WK3 W2 back in 2-3 after the measurements.

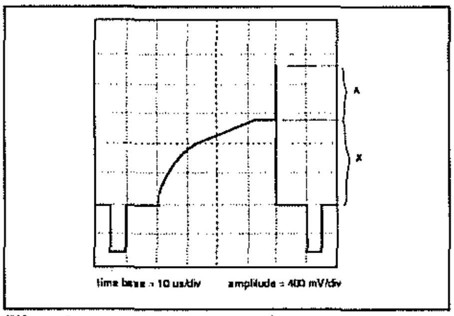


Fig. 8, contour correction on

Section 4: Replacements

Contents

1. Introduction

The exchange procedures are easy to follow with the exploded view of the camera, so pull out drawing Z6-1 of section Z.
For all the procedures, except paragraph 1.4., the camera has to be removed from the basiclens.
After an exchange procedure, check the next sections on programmings and/or adjustments to execute.

NOTE

1 *In case of replacement of the certifiable items (complete camera), always replace the duplicate label on the inside of the camera cap and on the central labelling station "i" of the stand.*

2 *In case replacement of either the Flex, or WK1, or WK2 is necessary, all three these items must be replaced at the same time. The reason is, that the contacts of the Flex, WK1 and WK2 have been gold plated recently, and gold may not be used in combination with other contact material.*
Only if your Flex, and WK1 and WK2 are of the gold plated type, they may be replaced separately.
Code nrs. of NON-gold plated Flex, WK1 and WK2 are: 4522 167 0013., 4522 167 0006./4522 167 0007. and 4522 167 0008., while the three gold plated items have completely different code nrs., being: 4522 167 0137., 4522 167 0134./4522 167 0135. and 4522 167 0136..

1.1. Exchanging the Flex

(1) disconnect the flex from WK1 (pull the connector towards you and turn it open)
(2) disconnect the flex from WK2 (pull the connector open)
→ WARNING! This connector is rather weak and can easily be damaged when removing, because the pinching action is not expected!
(3) unscrew [1], and remove the slider
(4) move (with care) the top-plate with the flex out of the sliders
(5) remove the flex connections [2]
(6) exchange the flex with a new one
(7) connect the flex [2] to the top-plate and basic-plate
(8) position the top-plate with flex so that the flex can move between the plates (see the drawing Z6-1)
(9) connect the flex to the WK2 PCB (move the flex into the connector and lock it)
(10) connect the flex to the WK1 PCB (move the flex into the connector and lock it)
(11) mount the slider [1] back to its place

1.2. Exchanging the PCBs

1.2.1. Exchange the sensor assembly

(1) disconnect the flex from WK1 (pull the connector towards you and turn it open)
(2) disconnect WK1:X8 and WK1:X9
(3) loosen the 3 socket-screws [3] (2.5 mm socket-screw driver)
(4) remove the assembly and exchange it with the new one (careful with the flex)
(5) fix the new assy 3 x [3] and connect the flex to WK1 (move the flex into the connector and lock it)
(6) connect WK1:X8 and WK1:X9

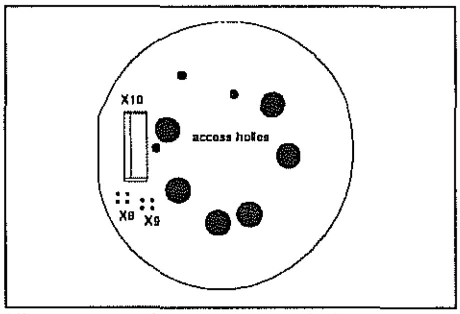


Fig. 1, *see the location of X8 and X9*

1.2.2. Exchange WK2, WK4 or option WK6

(1) follow the instructions (1) until (5) of paragraph 1.1

(2) unscrew 1 x [4] and 2 x [9], remove the basic-plate
(3) unscrew 2 x [5] of the defective PCB
(4) if WK2 is defect and the option iris remote control WK6 is mounted you have remove WK6 first
(5) exchange the PCB and fix it with the screws [5]
(6) mount the basic-plate back to its place [4] and [9]
(7) follow the instructions (7) and on, of paragraph 1.1

1.2.3. Exchange the shielded WK5

(1) follow the instructions (1) until (5) of paragraph 1.1
(2) remove the two screws [9] from the basic plate flex
(3) remove the two plastic screws [10]
(4) exchange the shielded WK5 and fix it with 2 x [10]
(5) mount the basic plate to its place [4] and [9]
(6) follow the instructions (7) and on, of paragraph 1.1

1.2.4. Exchange WK3

(1) follow the instructions (1) until (5) of paragraph 1.1
(2) unscrew 1 x [4] and 2 x [9], remove the basic-plate
(3) remove all [5] screws and remove WK2, WK4 and WK5 (also WK6 if present)
(4) unscrew 2 x [6] of WK3 and exchange the PCB, fix it 2 x [6]
(5) mount and fix WK4, WK5 and WK6 with [5], mount the basic-plate back to its place [4] and [9]
(6) follow the instructions (7) and on, of paragraph 1.1

1.3. Exchanging the iris motor (if present) and potentiometer

1.3.1. Exchange the motor (if present)

(1) follow the instructions (1) till (3) of paragraph 1.2.1 and remove the assembly
(2) unscrew 2 x [7] and remove the motor
(3) fix the new motor with 2 x [7]
(4) mount the sensor assy back to its place, (5) and (6) of 1.2.1

1.3.2. Exchange the potentiometer

(1) follow the instructions (1) till (3) of paragraph 1.2.1 and remove the assembly
(2) unscrew 2 x [8] and remove the potentiometer
(3) remove also the irismotor 2 x [7] (if present)
(4) measure with a multimeter the resistance of pin 1 and 3 (R13) of the new pot.meter, measure also between pin 1 and 2 (R12); 2 and 3 (R23).
Adjust the pot.meter to the value $(0.04 \times R13) + \frac{((R12 + R23) - R13)}{2}$ (turn the axis)
(5) close the diaphragm as far as possible, unlock the diaphragm [9] and close the diaphragm with [10]. If the iris remote control is present then the diaphragm is accessible through the hole where the motor has to be mounted
(6) mount the new pot.meter to its place 2 x [8]
(7) execute the adjustment in (4) ones more, loosen the screws [8] a bit so you can adjust the pot.meter by turning the house
(8) fasten the pot.meter 2 x [8] and mount the motor 2 x [7] (if present)
(9) mount the sensor assy back to its place, (5) and (6) of 1.2.1

Section 5: Programmings

Contents

1. Introduction

Normally the camera is delivered in a factory assembled and adjusted II/TV subsystem. There are no mechanical or electrical adjustments required in the field.
Only incase of a replacement the programmings have to be executed.

2. Hardware programmings

NOTE

MF = Measuring Field, RF/RC = Radiography-Fluoroscopy stands / Remote-Controle stands.
See drawing Z3-1 for the location of the jumpers/switches.

* *There are no jumpers/switches on the PCBs: WK1 (Preproc.1) and WK2 (Preproc.2).*

*1 *on/off don't care in this application.*

*2 *Max. VIBS level programming depends on the type of monitor, see the monitor manual.*

*3 *for integrated XTV-cable only (RF/RC stands), see also Z3-1. For surgery no cable compensation necessary park the jumper (A1-2 or A2-3).*

*4 *S2:2; on in case of an IP-tube and off in case of a HC-tube.*

PCB	Jumper/ Switch	Position	Operation	Delivered	
				RF/RC	BV25/26
WK3 AGC/ADC 1	W1	1-2 (2-3)	blockgenerator on (off)	2-3	2-3
	W2	1-2 (2-3)	rampgenerator on (off)	2-3	2-3
	W3	1-2 (2-3)	videoproc. bypass (normal use)	2-3	2-3
	X19	A-B 1	3.3 till 10 m — cable *3 compensation depends on the used cable lenght		
		A-B 2	10 till 16.7 m		
		A-B 3	16.7 till 25 m	A-B 3	other A2-3
		other	0 till 3.3 m		
WK4 AGC/ADC 2	W1	1-2 (2-3)	clean circle on (off)	1-2	1-2
	S1:1	on (off)	surgery (RF/RC)	off	on
	S2:1	on (off)	X-tal lock (mains lock)	on	on
	S2:2	on (off)	contour correction; on (off)	*4 ..	on
	S2:3	on (off)	frame accumulation (field)	on	on
	S2:4	on (off)	white compression; curve 1 (curve 2)	off	on
	S2:5	on (off)	fixed gain; on (off = normal use)	off	off
	S2:6	on (off)	max. VIBS level; 1100 mV (700 mV)	*2 on	*2 on
	S3:1	on (off)	horizontal image; normal (inverted)	on	on
	S3:2	on (off)	ISU 9807 519 10001 (off = not used)	on	*1 on
	S3:3	on (off)	MF; relative (absolute) value	on	on
	S3:4	on (off)	MF rel C0 } see the table	on	on
	S3:5	on (off)	MF rel C1 } on the next page	off	on
	S3:6	on (off)	MF; remote (local) selectable	off	on
	S3:7	on (off)	MF; large (small) selected (if S3:6=off)	on	*1 on
	S3:8	on (off)	soft rise; on (off)	on	off
WK5 Videoproc.	S1	0	smallest circle blanking (CB). The CB		
	S1	..	will increase 8 lines with every step		
	S1	7	largest CB	0...7	7
	S1	8 till F	are the same values as for 0 till 7		
	S2	left (right)	normal use (MF visible on the image)	left	left

NOTE

The MF or the service cross is only visible on the monitor if WK5:S2 is positioned to the right and WK4:W1 in 1-2 (CLCL off).

S3:3 (MF relative/absolute)	S3:4 (MF rel C0)	S3:5 (MF rel C1)	Operation
on	off	off	service cross
on	off	on	not used
on	on	off	MF for RF/RC
on	on	on	MF for BV25/26
off	don't care	don't care	MF for BV29

The large or small MF are selectable with S3:7 (if S3:6 is off). The MF values are given in % of the nominal clean circle size, see the next table.

		BV25/26	RF/RC
large MF	9" format	-	60
	7" format	-	-
	5" format	50	-
small MF	9" format	-	40
	7" format	-	-
	5" format	30	-
		[%]	[%]

Section 6: Adjustments

Contents

1. Adjustment facilities

Mechanical adjustments

Adjustment	Service adjustment
centring of the image	yes
horizon	yes
optical camera focusing	yes

Eletrical adjustments

PCB	Potentiometer	Operation	Service adjustment
WK1 Preproc. 1	R24 R28 R57 R58	+ 15 V V sub. cross talk compensation gain	NO NO NO NO
WK2 Preproc. 2	non		-
WK3 AGC/ADC 1	P1 P2 P3 P4 P5 P6 P7 P8	amplitude blockgenerator doserate adjustment medium format doserate adjustment small format black level fixed gain adjustment AGC threshold small MF AGC threshold large MF offset	yes yes yes yes yes yes yes NO
WK4 AGC/ADC 2	non	-	-
WK5 Videoproc.	P1	videogain	yes

2. What to do table

After a replacement, of a PCB or a mechanical part, it might be necessary to execute a mechanical or electrical adjustment. The information in the following table is a guide through the necessary adjustments.

After replacement of	adjust	paragraph	comment
Flex cable	no adjustments	-	
Sensor assy	optical camera focusing centring of the image circle blanking size	3.1 3.2 4.8	 only for the RF/RC stands
Integrated optics	optical camera focusing centring of the image horizon circle blanking size	3.1 3.2 3.3 4.8	 only for the RF/RC stands
Iris potentiometer	doserate	4.9	see (sub)system manual
Iris motor assy	no adjustments	-	in case option is present
WK2 preproc. 2			
WK3 AGC/ADC 1 WK4 AGC/ADC 2 WK5 videoproc.	presettings video gain AGC threshold small MF AGC threshold large MF fixed gain doserate preset middle/small format black level circle blanking size doserate	4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9	see (sub)system manual
WK6 rotairis	doserate	4.9	in case option is present see also (sub)system manual

3. Mechanical adjustments

Warning

For all the mechanical adjustments you need to use fluoroscopy, protect yourself and execute the adjustments without being exposed to X-Rays if necessary use lead protection.

See drawing Z6-1 for the location of the adjustment nuts and screws.

3.1. Optical camera focusing

- remove the grid from the II-tube and all other irrelevant objects between the collimator and the X-ray tube
- put a line phantom (FUNK 38) in front of the II-tube (perpendicular to the TV scanning)
- see Z6-1, unlock the focusing screw
- the focusing screw is accessible through the preproc.1 board (see Z6-1), focus the image during fluoroscopy
- lock the focusing screw.

3.2. Centring of the image

- remove all objects between the collimator and the II-tube
- put a cross section phantom in front of the II-tube
- select the service cross, set: WK5 S2 to the right, WK4 S3-4 off and WK4 S3-5 off
- select large format
- see Fig. 2 (and Z6-1) for centring of the image use the two nuts (one nut can be reached underneath WK4)
- switch on fluoroscopy and examine the image on the monitor
- switch off fluoroscopy, see Fig.1 and adjust (with an open-ended spanner) the middle of the image (1) exactly in the middle of the blanking circle (2), check the position during fluoroscopy
- set WK5 S2 to the left and set WK4 S3-4 and S3-5 back to the original possition see section 5 of this manual.

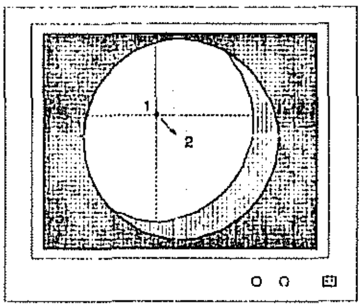


Fig 1, Centring of the image

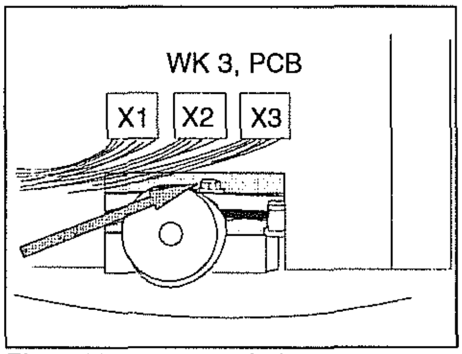


Fig 2, Use open ended spanner no. 7

3.3. Horizon adjustment

- put a cross section phantom in front of the II-tube
- select the service cross, set: WK5 S2 to the right, WK4 S3-4 off and WK4 S3-5 off
- loosen the 4 screws Z6-1 [8] the camera can be turned now
- check the position of the horizontal line during fluoroscopy
- turn the camera till the horizontal line is in the 0° position
- check the 0° position, during fluoroscopy, using image reverse horizontal (WK4:S3-1)
- fasten the 4 screws [8]
- set WK5 S2 to the left and set WK4 S3-4 and S3-5 back to the original possition see section 5 of this manual.

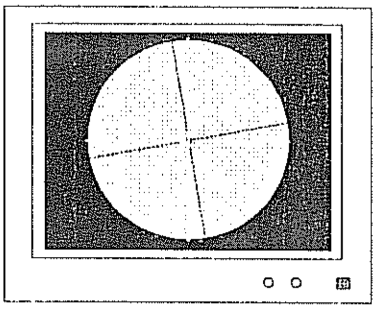


Fig 3, Horizon adjustment

4. Electrical adjustments

NOTE

All the video values are based on a max. VIBS of 1100 mV. So all the adjustments have to be executed with a max. VIBS of 1100 mV. When 700 mV is used (monitor depended) program this after execution of the adjustments.

All the adjustments in this chapter have to be executed in the correct sequence
*Measure VIBS: on **WK3:MP7** in case of a **surgery** stand (0V = WK4:MP1 or MP2)*
*and on the ISU **WN10MP1 and 2** or on the monitor in case of a **RF/RC** stand*

4.1. Presettings

See drawing Z3-1 for the location of the jumpers, switches and potentiometers.

Carry out the following settings: - jumper WK4 W1:2-3 (clean circle off)
- switch WK4 S2-6:on (max. VIBS = 1100 mV)

- set jumper WK3 W1:1-2 (block gen. on) and turn WK3:**P1** clock wise (amplitude = 0V)
- measure with an oscilloscope on VIBS (trigger external on the midline WK5:MP1)
- adjust the black level with WK3:**P4** to 45mV for surgery and 20mV for RF/RC systems

4.2. Video gain

set: WK3 W2:1-2 (rampgenerator on)
WK4 S2-4:off (white compression curve 2)

- measure VIBS and adjust the top of the video to 1100 mV with WK5:**P1** see fig. 3

set: WK3 W2:2-3 (rampgenerator off)
in case of surgery WK4 S2-4:on (white compression curve 1)
- adjust the black level once more with WK3:**P4**
- measure on WK3:MP1 / MP14 VIN and adjust the block gen. with WK3:**P1** to 250 mV

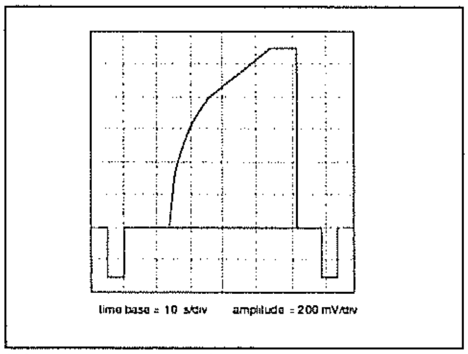


Figure 2, max. video level

4.3. AGC threshold small MF

- set: WK4 S3-6:off (MF local selectable)
  WK4 S3-7:off (small MF selected)
- measure VIBS and adjust the threshold to 400 mV with WK3:**P6**

4.4. AGC threshold large MF

- set: WK4 S3-7:on (large MF selected)
- measure VIBS and adjust the threshold to 400 mV with WK3:**P7**

4.5. Fixed gain adjustment

- set WK4 S2-5:on (fixed gain on)
- measure VIBS and adjust the level to 400 mV with WK3:**P5**

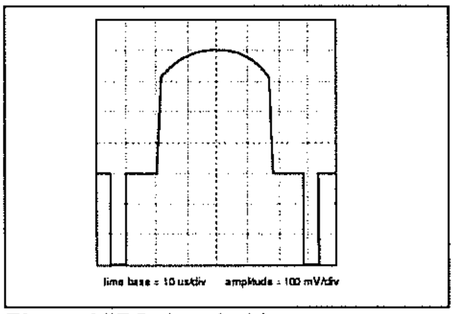


Fig. 3, VIBS threshold

4.6. Doserate preset for middle and small format

- in case of a 15cm (6") II-tube or an IP II-tube continue with 4.7.
- select the middle format
- measure the video on VIN WK3:MP1 and adjust the block generator to 250 mV with WK3:**P1**
- measure with a voltmeter the DRFLDFPA signal WK3:MP13 (0V = WK4:MP1 or MP2) and adjust it with WK3:**P2** to to 0V
- select the small format
- measure with a voltmeter the DRFLDFPA signal WK3:MP13 and adjust it with WK3:**P3** to 0V

4.7. Black level adjustment

- set WK3:W1 2-3 (block gen. off)
- measure the signal on VIBS and adjust the black level with WK3:**P4** to 45 mV for surgery and 20mV in case of RF/RC systems

4.8. Circle blanking size adjustment

- in case of a surgery stand continue with 4.9.
- select with WK5:S1 the correct circle blanking size, it just has to cover the image circle.

Put the jumper/switch setting back to its original position (check section 5, Programmings)
- jumper WK4 W1:1-2 (cleancircle on)
- switch WK4 S2-6:(max. VIBS, monitor depended)
- switch WK4 S3-6:on (MF remote selectable)

4.9. Doserate adjustment

NOTE

When it is not possible to remove the Grid from the II container, then multiply the doserate value with 1.4, this must be done to exclude the influence of the Grid. Be sure that the SID (Source Image Distance) is the same as specified for the Grid.

- remove the grid from the II-shield
- select large format
- put an 1.5 mm Cu plate infront off the X-ray tube
- see the system manual for the settings and the doserate values
- if the desired doserate is set, measure the DRFLDFPA signal WK3:MP13 during fluoroscopy and adjust the irisdiaphragm manualy (see Z6-1) untill DRFLDFPA = 1.5V for a surgery stand and for a RF/RC stand 0V. If the option Irisdiaphragm Remote Control is present then the irisdiaphragm can be adjusted with WK6:**P1**

Incase of an one format system the doserate adjustment is finished, for the triple format systems continue with the adjustments.

- select the middle format and set the desired doserate (see the system manual)
- check if the DRFLDFPA signal on WK3:MP13 stabilizes on 0 V ± 10% (during fluoroscopy) if not readjust WK3:**P2** untill DRFLDFPA stabilizes on 0 V
- select the small format and set the desired doserate (see the system manual)
- check if the DRFLDFPA signal on WK3:MP13 stabilizes on 0 V ± 10% (during fluoroscopy) if not readjust WK3:P3 untill DRFLDFPA stabilizes on 0 V

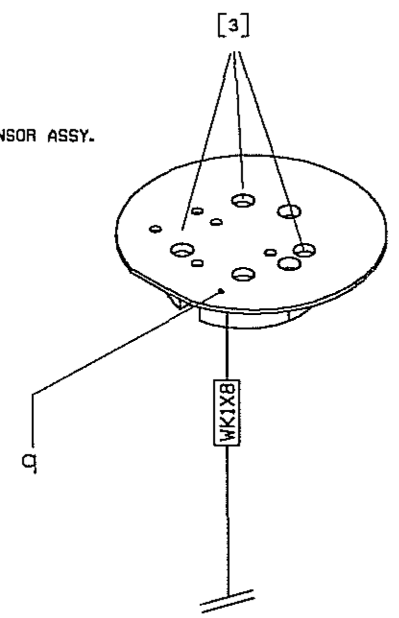
Philips Medical Systems

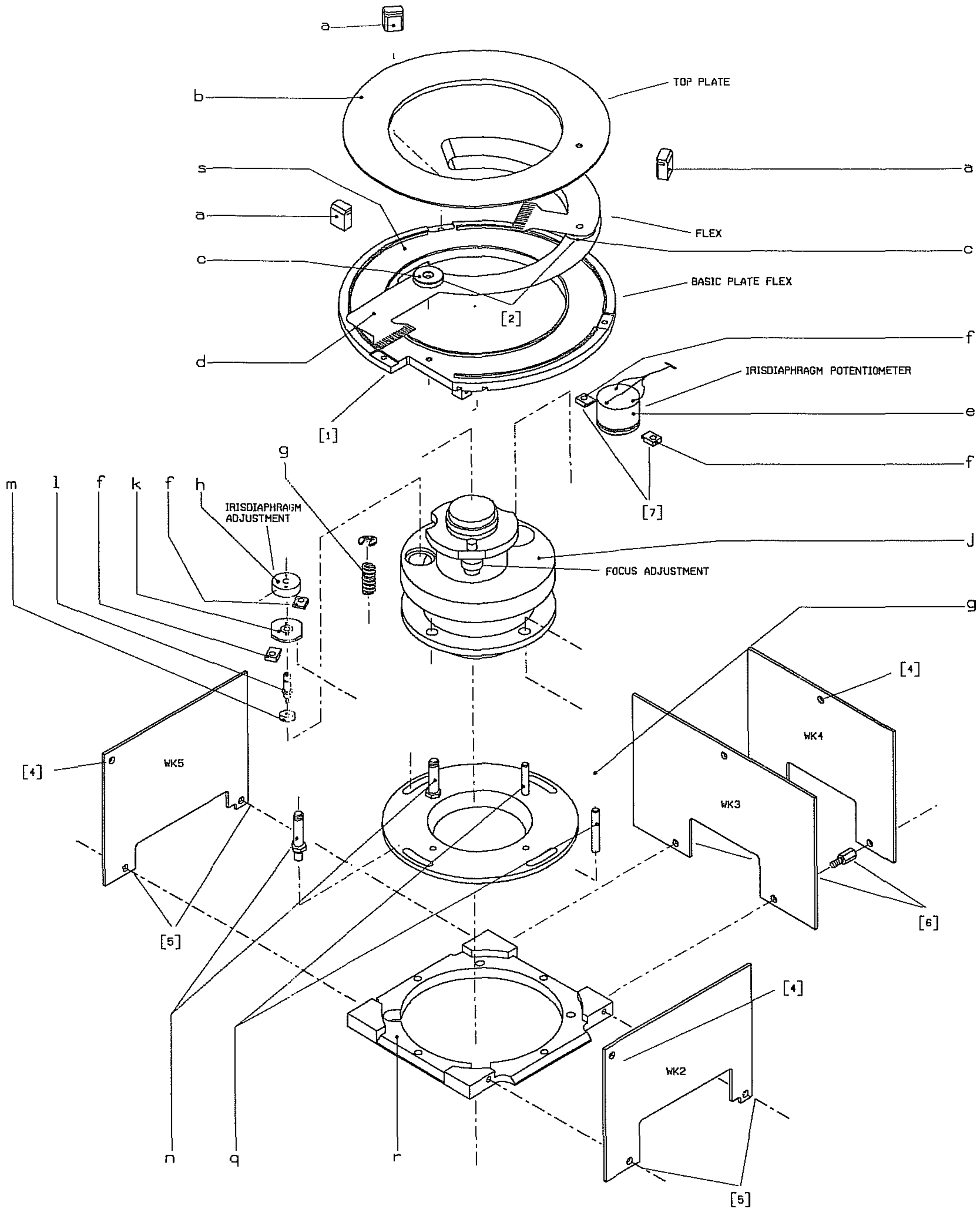
PARTS LIST — Service

Description	: XTV8S/50 HZ/60 HZ CCD TV-CHAIN	**Ref. No.**	:	9896 010 02261
			:	9896 010 02271
			:	
			:	
Publication No.	: 4522 983 33941	**Product Group**	:	744

LIST OF PAGES AND DRAWINGS

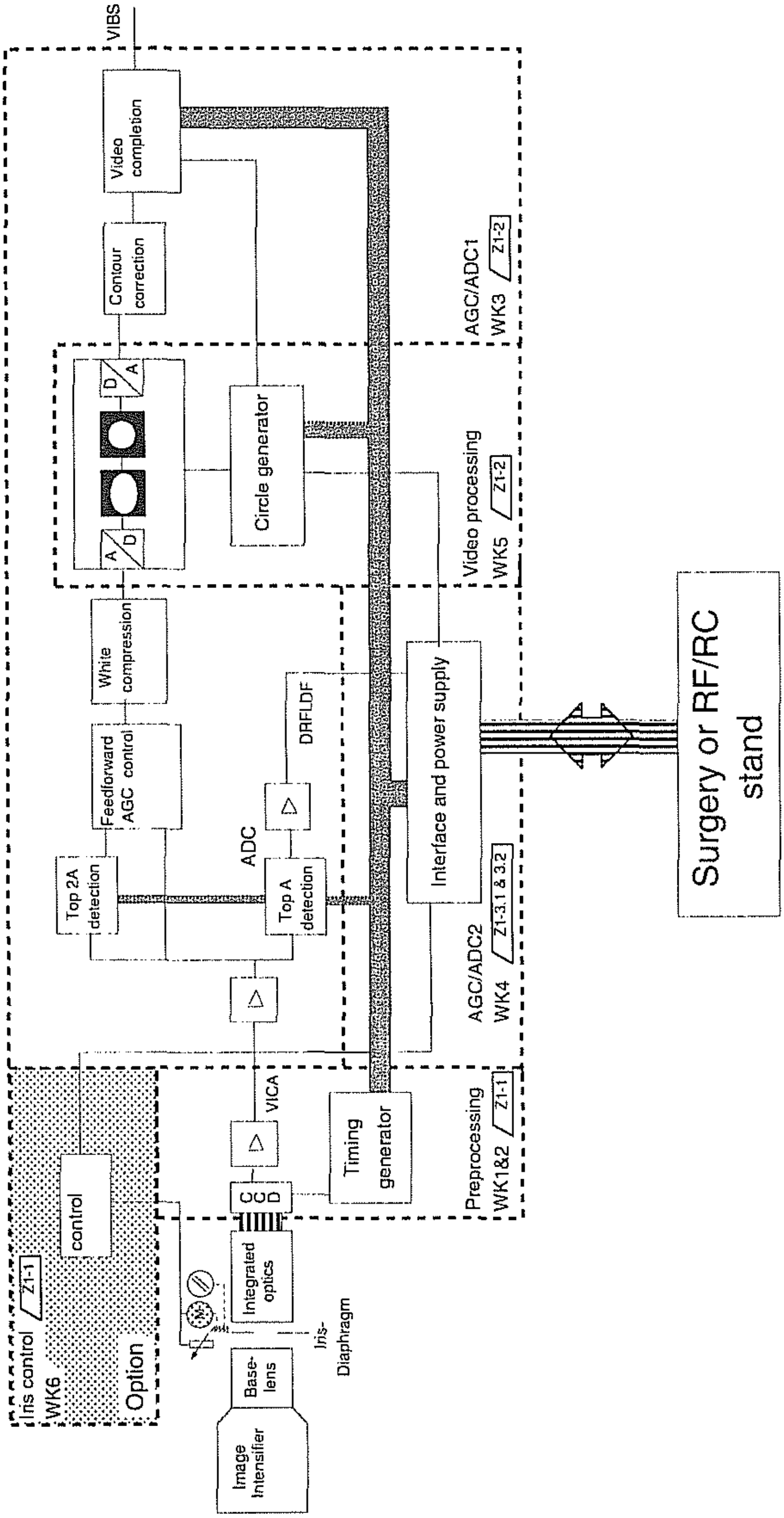
SCHEME/ PAGE 1	INDEX 2	CODENUMBER 3	DESCRIPTION 4	DATA 5
PZ-1	WK2	4522 167 01341	preprocessing board 2	
PZ-1	WK3	4522 167 00109	AGC/ADC 1 board	
PZ-1	WK4	4522 167 00112	AGC/ADC 2 board	
PZ-1	WK5	4522 167 00682	Video proc. 1 board 60 Hz	
PZ-1	a	4522 161 68823	distance block	3x
PZ-1	b	4522 161 85242	top plate	
PZ-1	c	4522 161 69302	fixing ring for flex	2x
PZ-1	d	4522 167 01371	Rotaflex	
PZ-1	e	4522 161 75421	iris potmeter assy	
PZ-1	f	4522 121 80363	clamping block	4x
PZ-1	g	4522 161 51781	pressure spring	4x
PZ-1	h	4522 161 69062	ring	
PZ-1	j	4522 161 69444	XTV-8S integrated optics	
PZ-1	k	4522 161 69042	ring	
PZ-1	l	4522 161 69004	pin	
PZ-1	m	4522 161 69022	gear wheel	
PZ-1	n	4522 161 69182	screw	2x
PZ-1	o	4522 161 69161	threaded end	2x
PZ-1	p	4522 161 68984	ring	
PZ-1	q	4522 161 75361	sensor assy 50 Hz	50Hz
PZ-1	q	4522 161 75381	sensor assy 60Hz	60Hz
PZ-1	r	4522 161 68724	coupling plate	
PZ-1	s	4522 161 68744	plate for flex	


[3]
SENSOR ASSY.
WK1X8
q

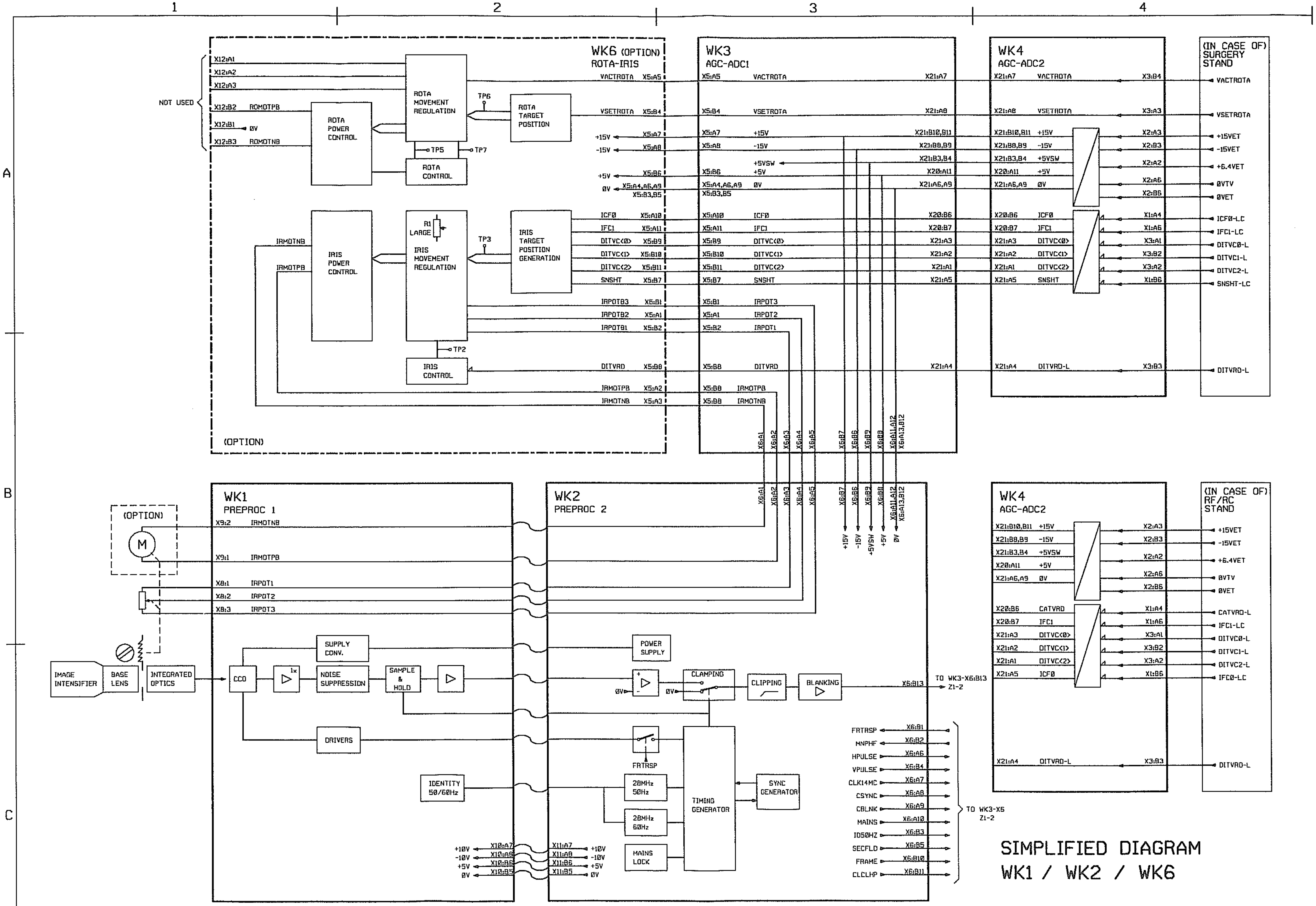

a
b
TOP PLATE
a
s
a
FLEX
c
c
BASIC PLATE FLEX
[2]
d
f
IRISDIAPHRAGM POTENTIOMETER
e
[1]
f
g
[7]
m
l
f
k
f
h
IRISDIAPHRAGM
ADJUSTMENT
J
FOCUS ADJUSTMENT
g
[4]
WK4
[4]
WK5
WK3
[5]
[6]
[4]
WK2
n
q
r
[5]

Section Z: Drawings

Contents



Block diagram



SIMPLIFIED DIAGRAM WK1 / WK2 / WK6

Section Z

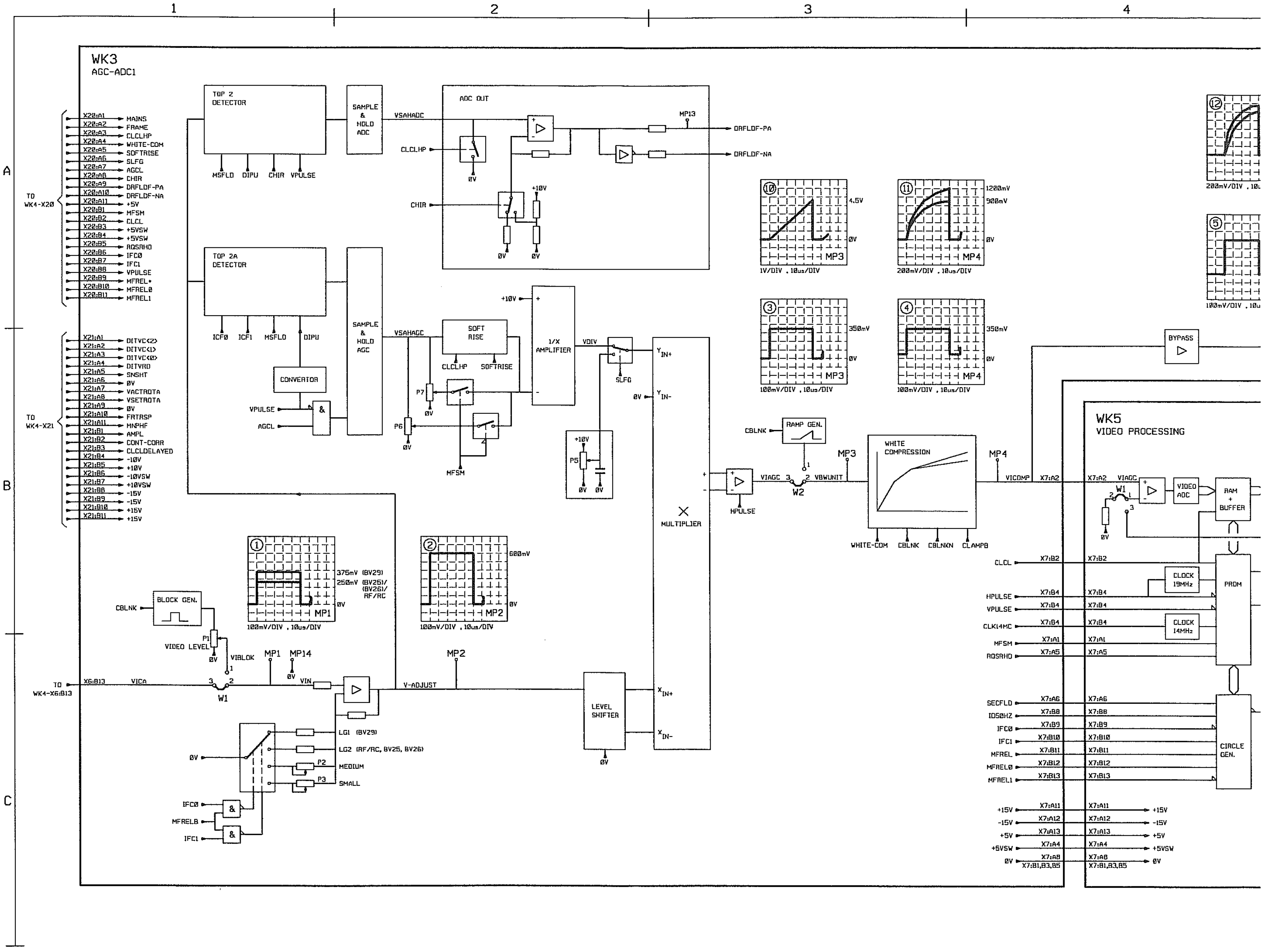
XTV8-S

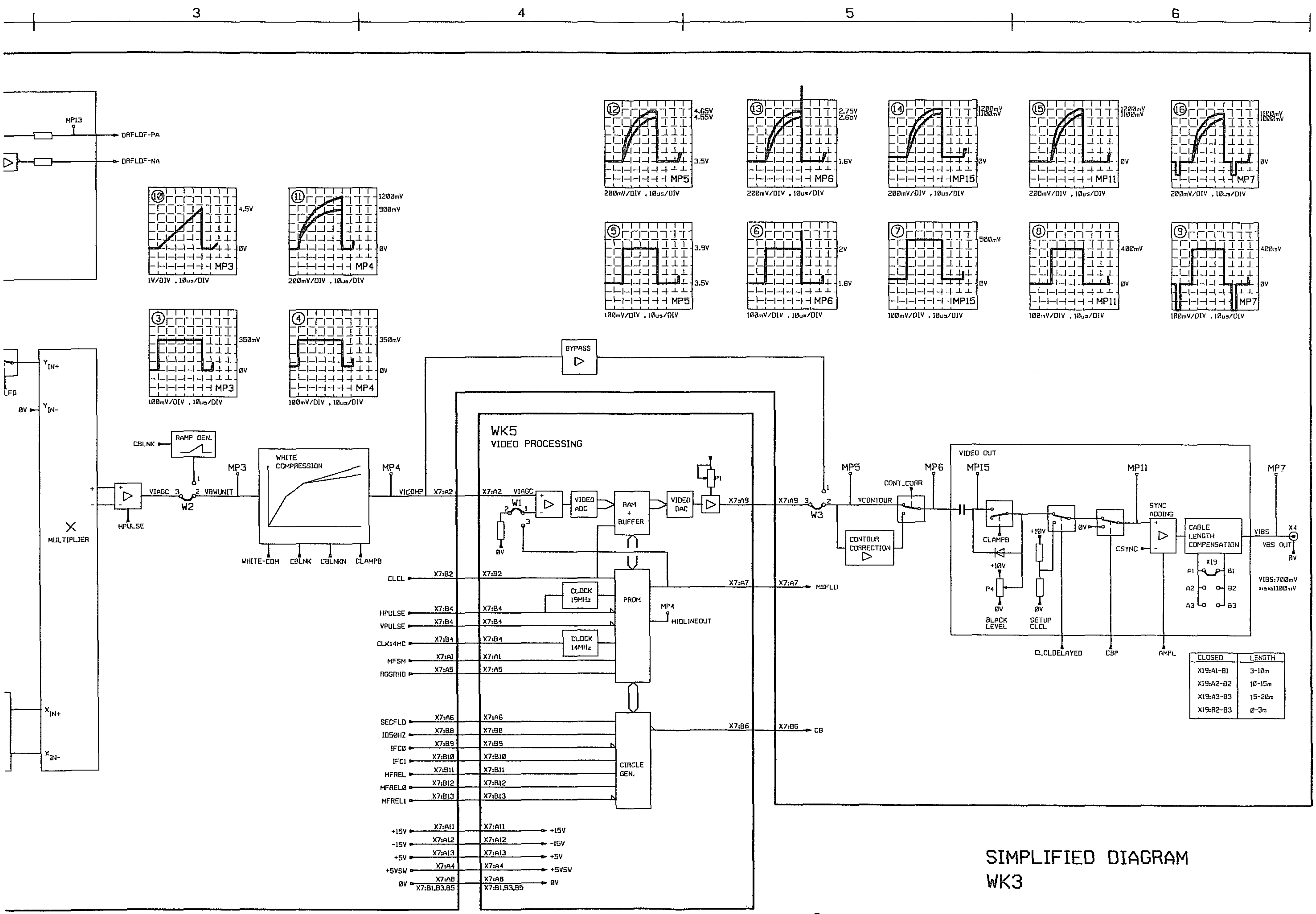
4522 983 3751. (NOT TO BE USED FOR ORDERING SERVICE MANUALS)

Section Z

XTV-8S / XTV-8SRI

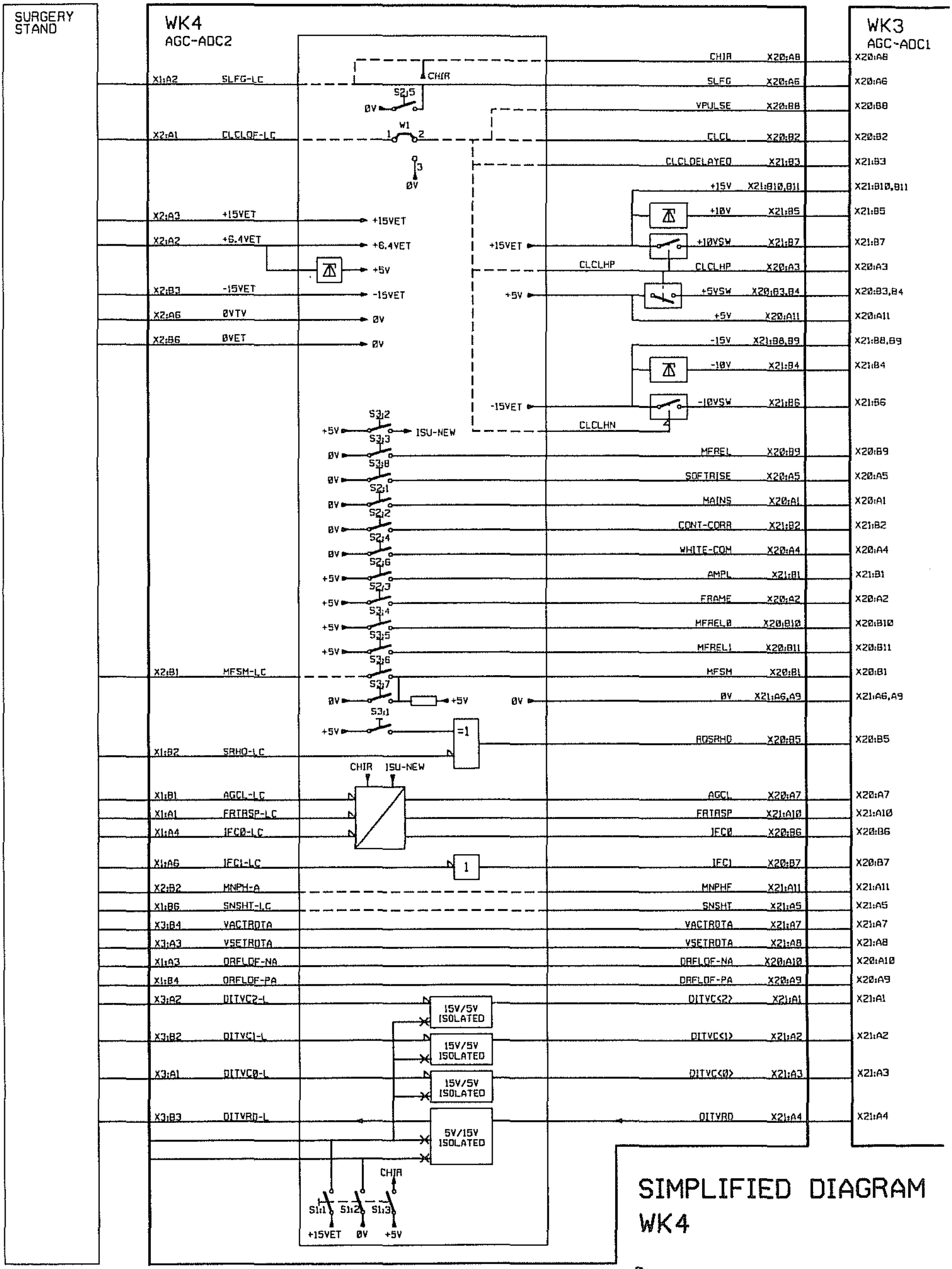
4522 983 3751.(NOT TO BE USED FOR ORDERING SERVICE MANUALS)





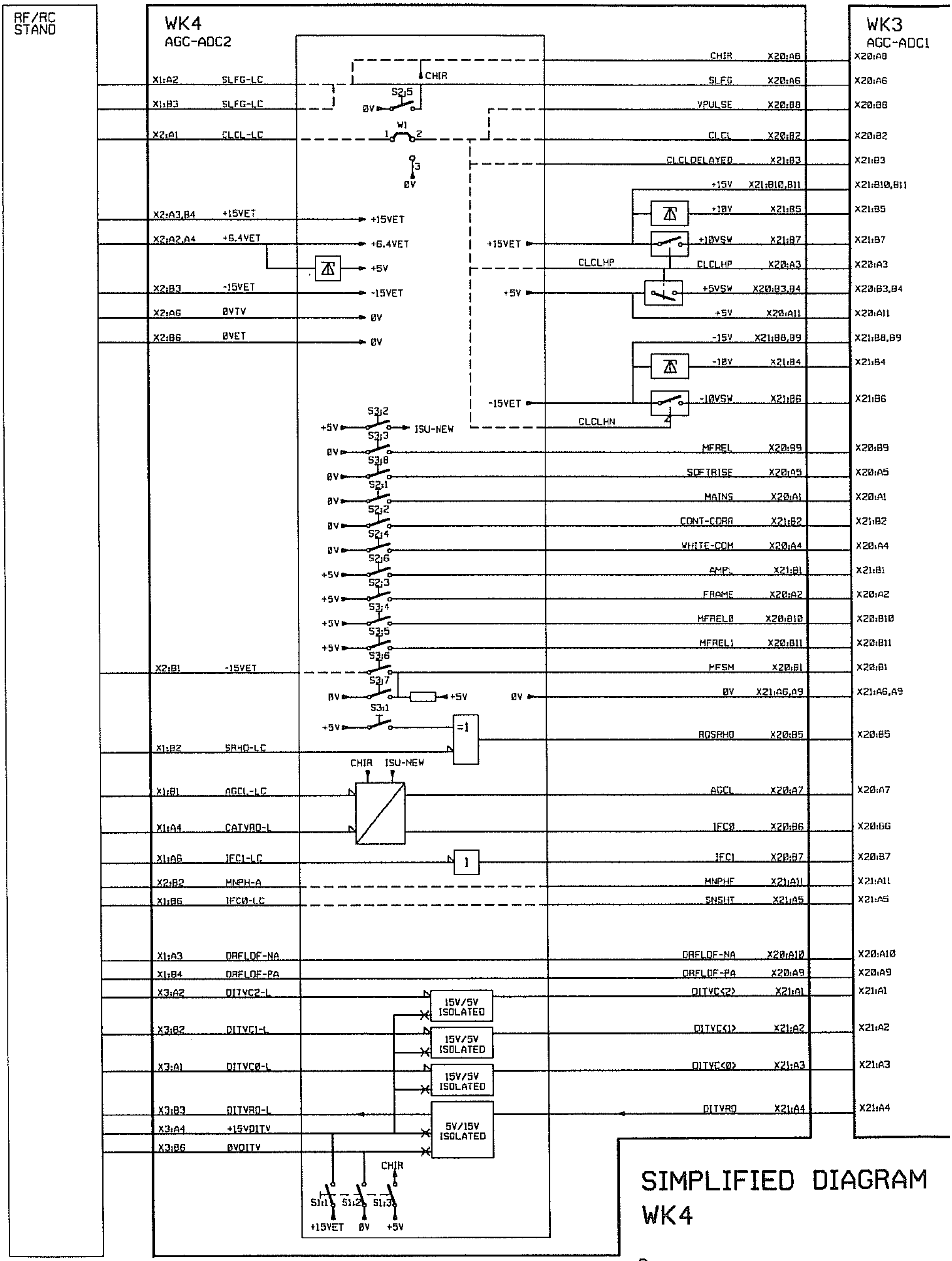
CLOSED	LENGTH
X19:A1-B1	3-10m
X19:A2-B2	10-15m
X19:A3-B3	15-20m
X19:B2-B3	0-3m

SIMPLIFIED DIAGRAM
WK3

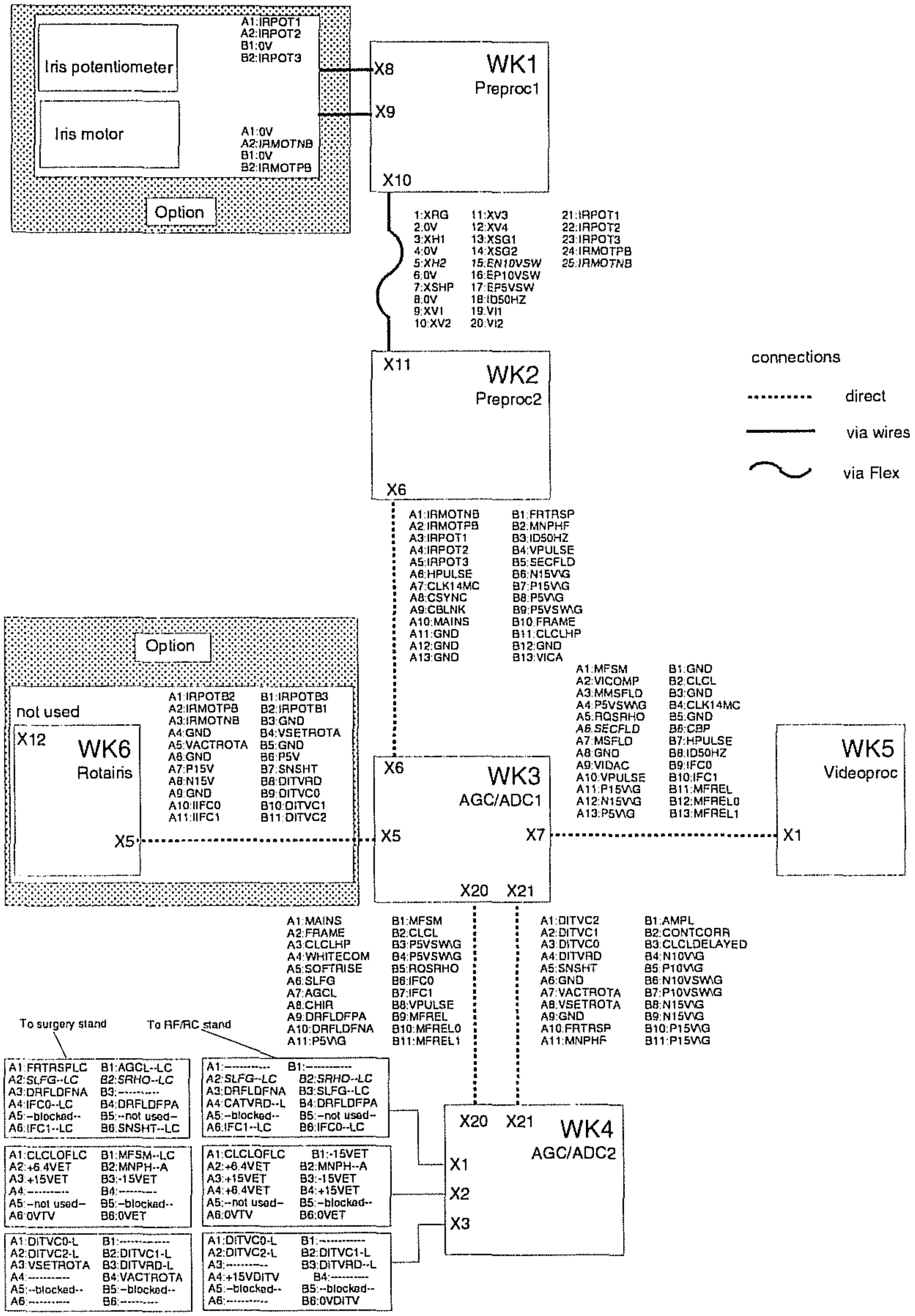


SIMPLIFIED DIAGRAM
WK4

4522 983 3751. (NOT TO BE USED FOR ORDERING SERVICE MANUALS)

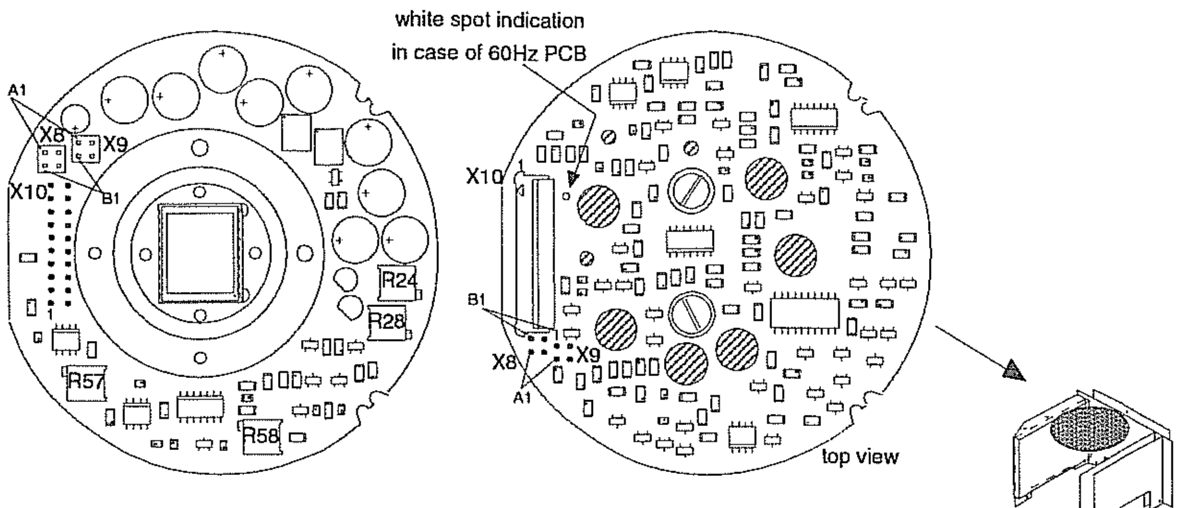


SIMPLIFIED DIAGRAM WK4

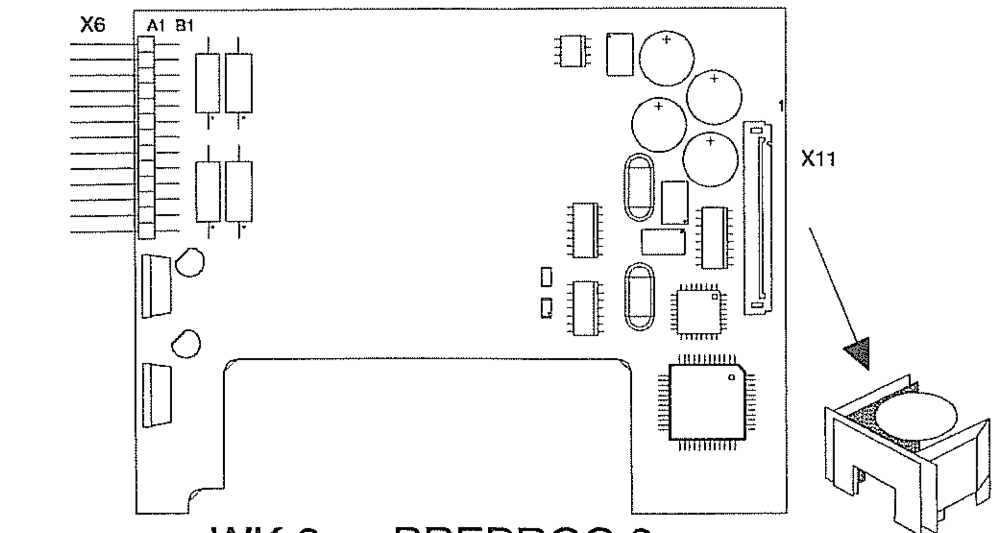


Connection overview

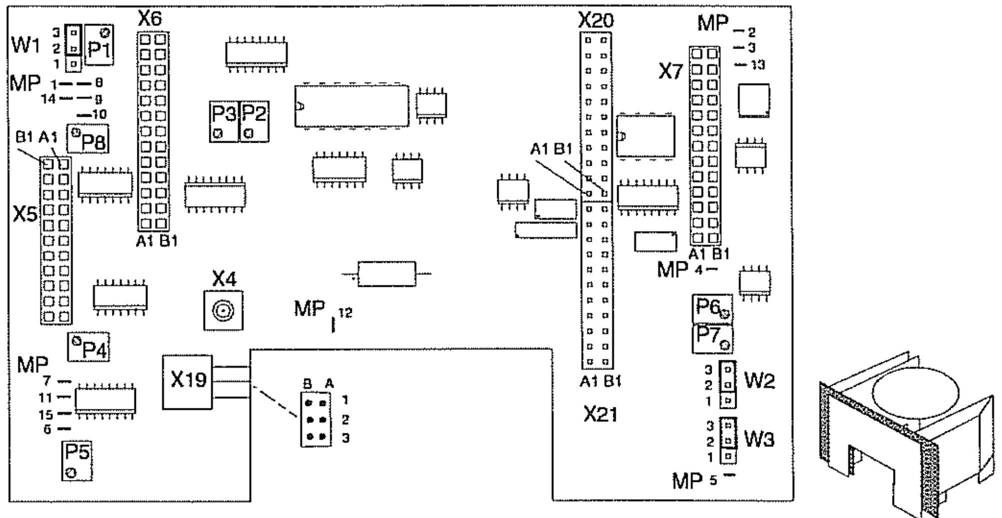
Mnemonic	Explanation	Mnemonic	Explanation
AGCL	Automatic Gain Control Lock	N10V	Negative 10 V
AMPL	AMPLitude	N10VSW	Negative 10 V SWitched
		N15V	Negative 15 V
CBLNK	Circle BLaNKing		
CBP	Circle Blanking	P5V	Positive 5 V
CHIR	CHIRurgie (surgery)	P5VSW	Positive 5 V SWitched
CLCL	CLean CircLe	P10VSW	Positive 10 V SWitched
CLCLDELAYED	CLean CircLe DELAYED	P15V	Positive 15 V
CLCLHP	CLean CircLe		
CLK14MC	CLocK 14 Mega Cycles	ROMOTNB	ROtation MOTor Negative
CONTCORR	CONTour CORRection	ROMOTPB	ROtation MOTor Positive
CSYNC	C SYNChronisation pulse	ROPOTB1	ROtation POTentionmeter B1
		ROPOTB2	ROtation POTentionmeter B2
DITVC0	DIaphragm TV Code 0	ROPOTB3	ROtation POTentionmeter B3
DITVC1	DIaphragm TV Code 1	RQSRHO	ReQueSt Reverse Horizontal
DITVC2	DIaphragm TV Code 2		
DITVRD	DIaphragm TV ReaDy	SECFLD	SECond FieLD
DRFLDFPA	DoseRate FLuoroscopy	SLFG	SeLect Fixed Gain
	Differential Signal	SNSHT	SNap SHoT
	Positive Analog	SOFTRISE	SOFTRISE
DRFLDFNA	DRFLDFNegative Analog		
		VACTROTA	Voltage ACTual ROTAtion
FRAME	FRAME / field	VSETROTA	Voltage SETpoint ROTAtion
FRTRSP	FRame Transfer Suppression	VI1	Video 1
		VI2	Video 2
GND	GrouND	VICA	VIdeo CAmera
		VICOMP	VIdeo after white COMPression
HPULSE	Horizontal line PULSE	VIDAC	VIdeo after Digital/Analog Conversion
		VPULSE	Vertical line PULSE
ID50HZ	IDentity 50 HertZ		
IFC0	Intensifier Format 0	WHITECOM	WHITE COMpression
IFC1	Intensifier Format 1		
IRPOT1	IRis POTentiometer pin 1	XH1	Horizontal clock 1
IRPOT2	IRis POTentiometer pin 2	XH2	Horizontal clock 2
IRPOT3	IRis POTentiometer pin 3	XRG	Reset Gate
IRMOTNB	IRis MOTor Negative	XSG1	Sensor charGe 1
IRMOTPB	IRis MOTor Positive	XSG2	Sensor charGe 2
		XSHP	Sample Hold Pulse
MAINS	MAINS	XV1	Vertical clock 1
MFREL	Measuring Field RELative	XV2	Vertical clock 2
MFREL0	Measuring Field RELative 0	XV3	Vertical clock 3
MFREL1	Measuring Field RELative 1	XV4	Vertical clock 4
MFSM	Measuring Field SMall		
MMSFLD	Measuring Field	+6.4VET	+6.4 Volt ExTernal
MNPHF	MaiNs PHase	+15VET	+15 Volt ExTernal
MSFLD	Measuring Field	-15VET	-15 Volt ExTernal
		0VET	0 Volt ExTernal
		0VTV	0 Volt from TV



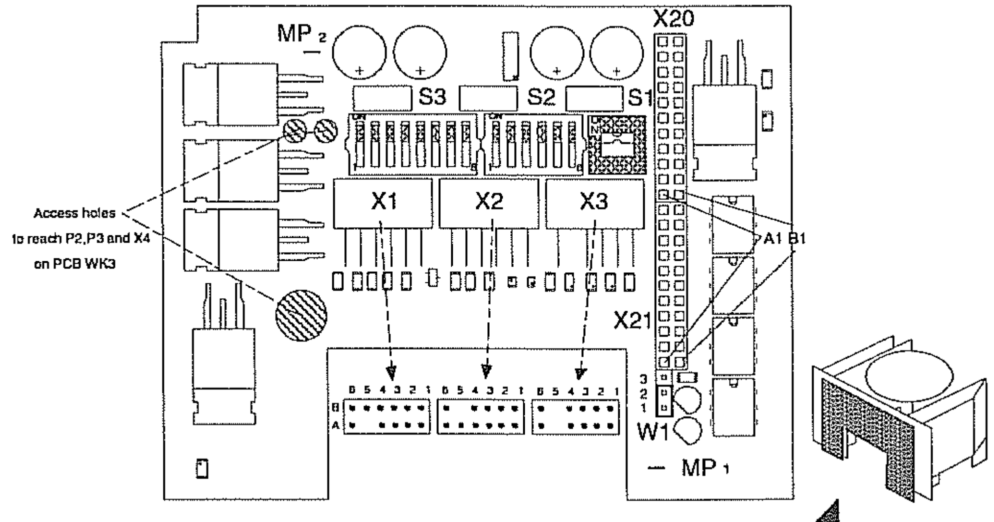
WK1 PREPROC 1



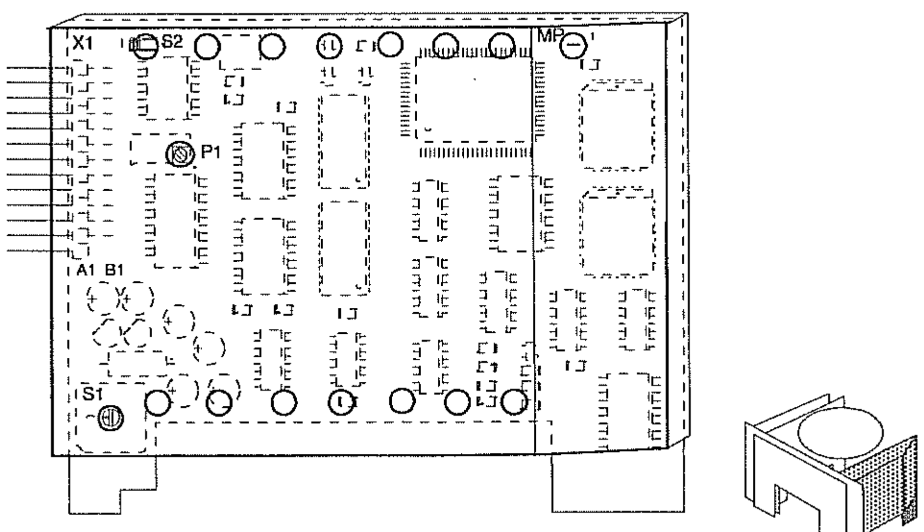
WK 2 PREPROC 2



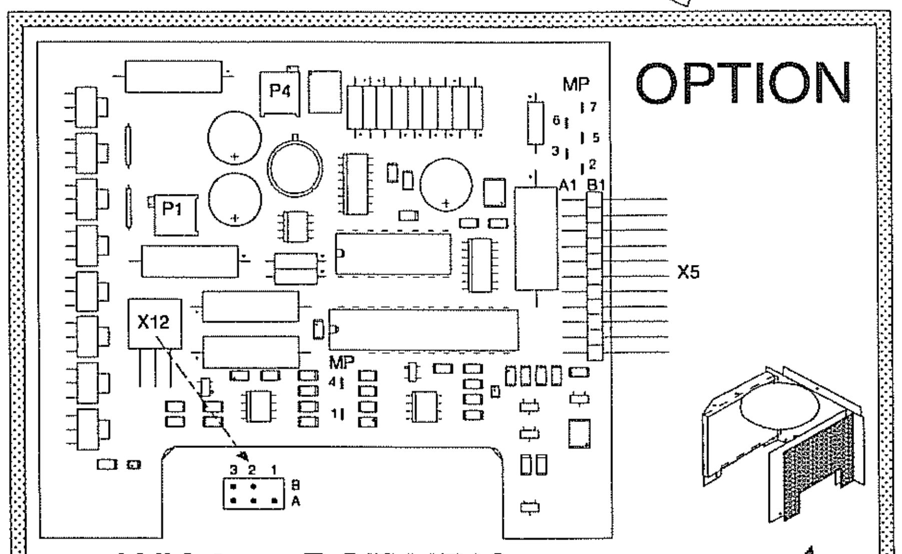
WK 3 AGC/ADC 1



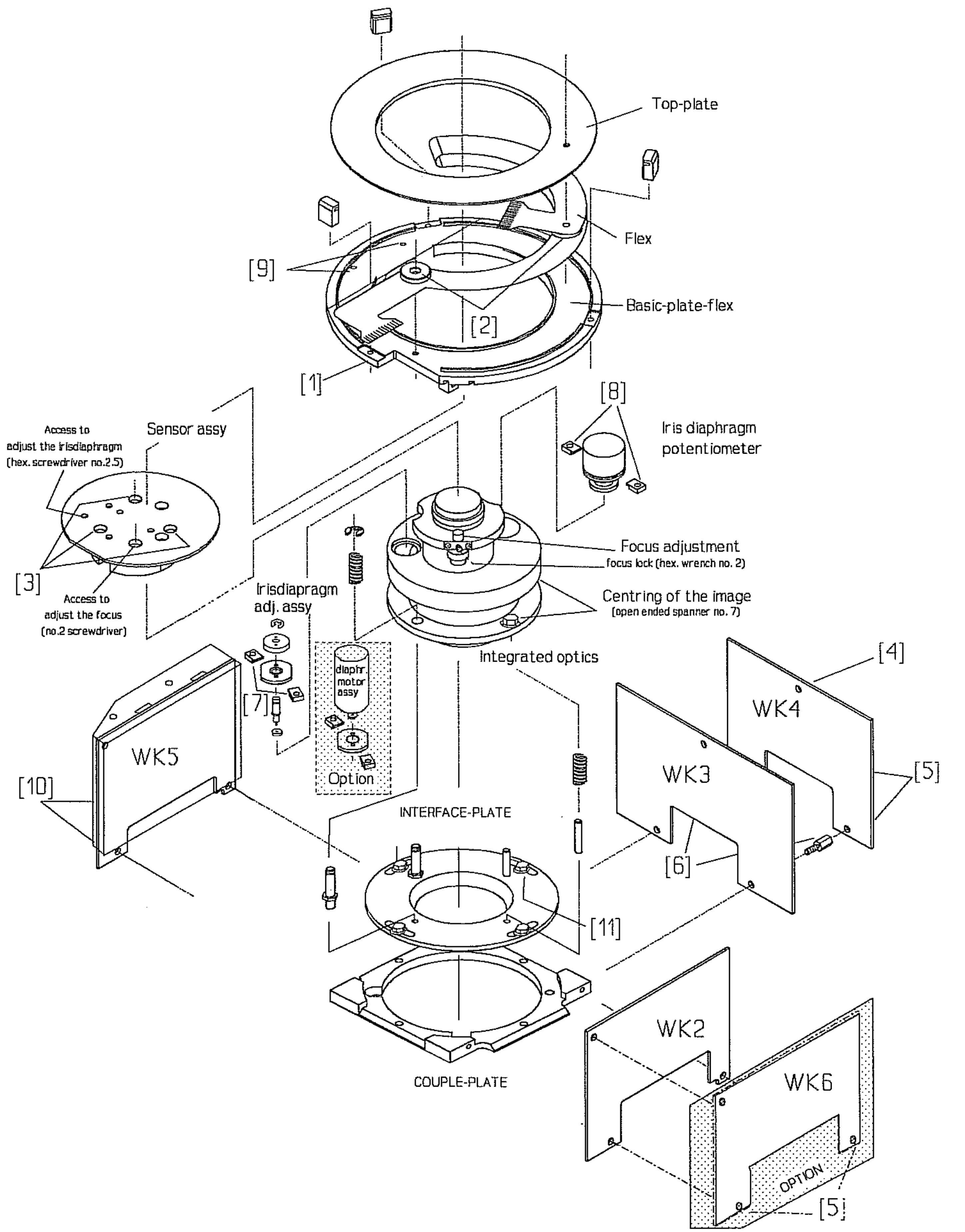
WK 4 AGC/ADC 2



WK 5 VIDEOPROC



WK 6 ROTAIRIS


Top-plate
Flex
[9]
Basic-plate-flex
[2]
[1]
[8]
Iris diaphragm
potentiometer
Access to
adjust the Irisdiaphragm
(hex. screwdriver no.2.5)
Sensor assy
[3]
Access to
adjust the focus
(no.2 screwdriver)
Irisdiapragm
adj. assy
Focus adjustment
focus lock (hex. wrench no. 2)
Centring of the image
(open ended spanner no. 7)
Integrated optics
diaphr
motor
assy
Option
[7]
WK5
[10]
[4]
WK4
WK3
[5]
[6]
INTERFACE-PLATE
[11]
COUPLE-PLATE
WK2
WK6
OPTION
[5]

FILING INSTRUCTIONS

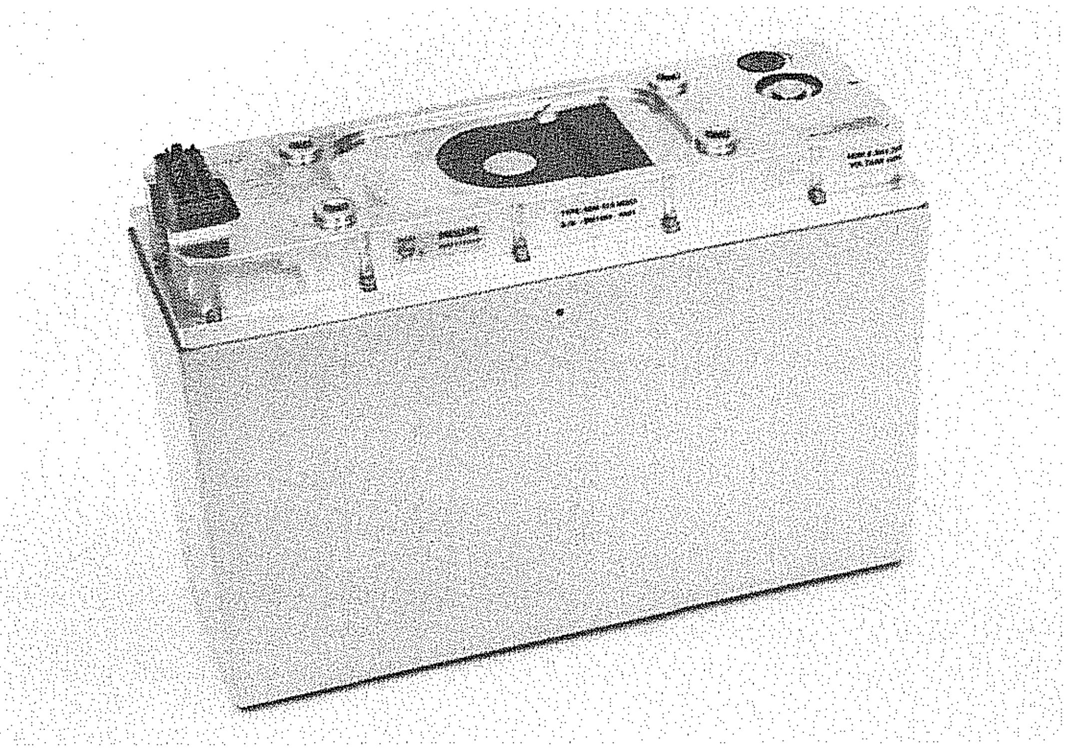
This manual should be filed in the System Manual of the Surgical Stand

SERVICE MANUAL - TECHNICAL UNIT

High Tension Converter Tank

9896 010 00221

For serial numbers, see list of pages and drawings



This manual contains descriptive information of the equipment identified by the typenumber and production series stated above.
For information on specific applications refer to the System Manual of the surgical Stand

PMSN Best

SERVICE MANUAL - TECHNICAL UNIT
HIGH TENSION CONVERTER TANK
TYPE NO. : 9896 010 00221

SERIAL NO. :

Manual codenumber : 4522 983 54321

List of Pages and Drawings

High Tension Converter Tank

Contents

1. INTRODUCTION AND TECHNICAL DATA

1.1. PURPOSE

The High Tension Converter Tank is a HT-tank with X-ray Tube and is intended for use in the BV25, BV26 and BV29 mobile surgical stand.

1.2. TECHNICAL DATA

NOTE

This specification gives maximum rating for the tank. Depending on the type and version of the system it may not be possible to operate at the maximum ratings.

1.2.1. Performance Data

Temperature:

- Operational temperature: 0° C < T < 40° C.
- At 25°C ambient temperature, the tank housing (except the mounting plane) without sterile cover will not exceed a temperature of 50°C within a time of 1.5 hours of operation at average power of 65 W.
- Oil temperature is sensed with an NTC resistor.
- For emergency a thermal switch in the tank will interrupt power at 85°C ± 5°C oil temperature.

Inherent Filtration:

- 3.0 mm Al equivalent.

Leakage technique factors:

- The leakage technique factors are 105 kV, 200 W.

X-Ray tube:

- FO 14, with double focus and stationary anode.

Fluoroscopy:

- 0.6 mm Focus is used.
- Duty cycle at maximum ratings (105 kV - 3.1 mA):
  30 sec on, 120 sec off during 90 minutes, ==> duty cycle 20%.
  Maximum continuous "on" time: 105 sec. at 105 kV.

HT Converter Tank

- Nominal voltage : 40 - 105 kV.
- Tube current : 0.1 - 3.1 mA.
- Average continuous load : 65 W.
- Radiation output : > 3.5 R/min. (measured at 60 cm from focus at 100 kV - 3mA).

Snapshot

Focus : 0.6 mm.

Tube voltage : 40....105 kV.

Tube current : 0.2 - 7.2 mA.

Max. "on" time : 300 msec at 105 kV.

Radiography A:

- 1.5 mm Focus is used.
- Duty cycle at maximum ratings (105 kV - 20 mA) : maximum 30 exposures/hour with 3% duty cycle.
- Nominal voltage : 40 - 105 kV.
- Tube current : 20 mA for max. 4.0 sec.
- Max. load : 2.1 kW during 1 sec.
- Repetition Rate : a: First two exposures : 1 exp./min. (100 kV - 20 mA).
  b: Wait for next two exposures : > 213 sec. [= 3.5 min.] (100 kV - 20 mA).
- Radiation output: > 350 mR/sec (measured at 60 cm from focus at 100 kV - 20 mA).

Radiography B:

Focus : 1.5 mm.

Tube voltage : 100....105 kV.

Tube current : 30 mA.

Max. Exposure time : 320 msec.

Cooling time : 20 sec.

Input voltage:

140 - 400 V, 300 Hz square wave.

Input voltage filament:

Maximum 17 V, 600 Hz square wave.

Electrical adaptation:

For the electrical interface of the tank, see the table below:

INTERFACE ON CONNECTOR	MNEMONIC	DESCRIPTION
GAX1: 1	FILSM1	Filament transformer small focus 1
2	FILSM2	Filament transformer small focus 2
3	NTC1	NTC temperature measuring circuit
4	MAMEAS1	mA measuring circuit 1
7	ACHVT1	AC voltage for high voltage transformer 1
8	FILCOM	Filament transformer common
11	PWRGND	Power ground
12	NLEA	Protective earth
14	FILLA1	Filament transformer large focus 1
15	FILLA2	Filament transformer large focus 2
16	NTC2	NTC temperature measuring circuit 2
17	MAMEAS2	mA measuring circuit 2
20	ACHVT2	AC voltage for high voltage transformer 2

1.2.2. Dimensions and Weights

For the dimensions of the tank, see drawing sheet Z3-1.
Weight: 14.5 kg. ± 0.15 kg.

1.2.3. Relevant standards

Compliance Status with STANDARDS is obtainable from:

Philips Medical Systems International
Corporate Quality Department
REGULATING and STANDARD group
Building QM118
PO Box 10.000
5680 DA BEST
The Netherlands

Fax. No. : 31-40-762205/762420
Tel. No. : 31-40-762408
Telext No. : 35000 PHTC NL
routing indicator XLQBUXA

2. INSTALLATION

For installation of the tank, see the instructions in the System Manual of the surgical Stand.

3. SETTING TO WORK

For warm-up procedure of the tube, see the System Manual of the surgical Stand.

4. CORRECTIVE MAINTENANCE

Due to legal prescriptions it is not allowed to exchange the tube in the tank.

If the tank is defective, replace it by a new one.

Fit the additionally supplied identification label(s) and date of manufacture label on the central labelling station, marked "I", of the surgical Stand.

NOTE

When the tank is defective within 1 year after installation you can return the defective tank with a questionnaire form. For return shipment use the package of the new tank.

Hochspannungs-Konvertertank

Inhalt

1. EINLEITUNG UND TECHNISCHE DATEN

1.1. VERWENDUNGSZWECK

Der Hochspannungs-Konvertertank ist ein Hochspannungs-tank mit Röntgenröhre und ist für die Verwendung in dem BV25, BV26 und BV29 mobilen chirurgischen Stativ bestimmt.

1.2. TECHNISCHE DATEN

ANMERKUNG

Diese Spezifikation gibt maximale Werte für den Tank. Abhängig von der Typ und der Ausführung des Systemes ist es möglich die maximale Werte nicht angewendet werden können.

1.2.1. Leistungsdaten

Temperatur:

- Betriebstemperatur: 0°C < T < 40°C.
- Die Gehäusetemperatur des Tanks wird nicht höher werden als 50°C innerhalb eine Betriebszeit von 1,5 Stunde, ausgenommen in der Montagefläche, unter folgende Bedingungen:
  Bei einer Umgebungstemperatur von 25°C, bei spezifizierter Einschaltzeit und maximaler Leistung, ohne sterilen Abdeckungen.
- Die Oeltemperatur wird mit Hilfe eines NTC-Widerstandes gemessen.
- Im Notfall unterbricht ein Thermoschalter im Tank bei einer Oeltemperatur von 85°C ± 5°C die Spannung.

Eigenfilterung:

- 3,0 mm Al äquivalent.

Röntgenröhre:

- FO 14, mit doppeltem Brennfleck und fester Anode.

Durchleuchtung:

- Brennfleck 0,6 mm.
- Einschaltdauer bei maximaler Leistung (105 kV - 3,1 mA):
  30 s ein, 120 s aus während 90 min, ==> Einschaltdauer 20%.
  Maximal ununterbrochen eingeschaltet: 105 s bei 105 kV.

- Nennspannung : 40 bis 105 kV.
- Röhrenstrom : 0,1 bis 3,1 mA.
- Mittlere Kontinuleistung : 65 W.
- Dosisleistung : > 3,5 R/min. (gemessen in 60 cm vom Focus bei 100 kV-3mA).

Schnappschuss:

Brennfleck : 0,6 mm.

Röhrenspannung : 40....105 kV.

Röhrenstrom : 0,2 bis 7,2 mA.

Max. Einschaltdauer : 300 ms bei 105 kV.

Aufnahmen A:

- 1,5 mm-Brennfleck.
- Einschaltdauer bei maximaler Leistung (105 kV - 20 mA) : Maximal 30 Aufnahmen pro Stunde bei einer Einschaltdauer von 3%.
- Nennspannung : 40 - 105 kV.
- Röhrenstrom : 20 mA während max. 4,0 s.
- Maximale Leistung : 2,1 kW während 1 sec.
- Wiederholungsfrequenz :
  a: Die erste zwei Aufnahmen : 1 Aufnahme pro Minuut (bei 100kV - 20 mA).
  b: Warten Sie für die folgenden 2 Aufnahmen : >213 s [= 3,5 min.] (bei 100kV - 20 mA).
- Dosisleistung : >350 mR/sec (gemessen an 60 cm vom Focus bei 100kV - 20mA).

Aufnahmen B:

Brennfleck : 1,6 mm.

Röhrenspannung : 100....105 kV.

Röhrenstrom : 30 mA.

Max. Aufnahmezeit : 320 ms.

Kühlzeit : 20 s.

Eingangsspannung:

140 - 400 V, 300 Hz-Rechteckspannung.

Eingangsspannung, Heizung:

Maximum 17 V, 600 Hz-Rechteckspannung.

Elektrische Anpassung:

Für die elektrischen Anschlüsse des Tanks siehe untenstehende Tabelle.

INTERFACE ON CONNECTOR	MNEMONIC	BESCHREIBUNG
GAX1: 1	FILSM1	Heizspannungstransformator, kleiner Brennfleck 1
2	FILSM2	Heizspannungstransformator, kleiner Brennfleck 2
3	NTC1	NTC Temperaturmessschaltung 1
4	MAMEAS1	mA-Messschaltung 1
7	ACHVT1	Wechselspannung für transformator 1
8	FILCOM	Heizspannungstransformator
11	PWRGND	Netz Erdleitung
12	NLEA	Schutzerdleitung
14	FILLA1	Heizspannungstransformator, grosser Brennfleck 1
15	FILLA2	Heizspannungstransformator, grosser Brennfleck 2
16	NTC2	NTC-Temperaturmessschaltung 2
17	MAMEAS2	mA-Messschaltung 2
20	ACHVT2	Wechselspannung für transformator 2

1.2.2. Abmessungen und Gewicht

Für die Abmessungen des Tanks siehe Zeichnung Blatt Z3-1.
Gewicht: 14,5 kg ± 0,15.

1.2.3. Gültige Normen

Uebereinstimmung mit Normen sind zu bekommen von:

Philips Medical Systems International
Corporate Quality Department
REGULATING and STANDARD group
Building QM118
PO Box 10.000
5680 DA BEST
The Netherlands

Fax. No. : 31-40-762205/762420
Tel. No. : 31-40-762408
Telext No. : 35000 PHTC NL
routing indicator XLQBUXA

2. MONTAGE

Für die Montage des Tanks, siehe die Anweisungen in der BV2.-Systemanleitung.

3. INBETRIEBNAHME

Für das Hochheizen der Röhre, siehe die BV2.-Systemanleitung.

4. KORRIGIERENDE WARTUNG

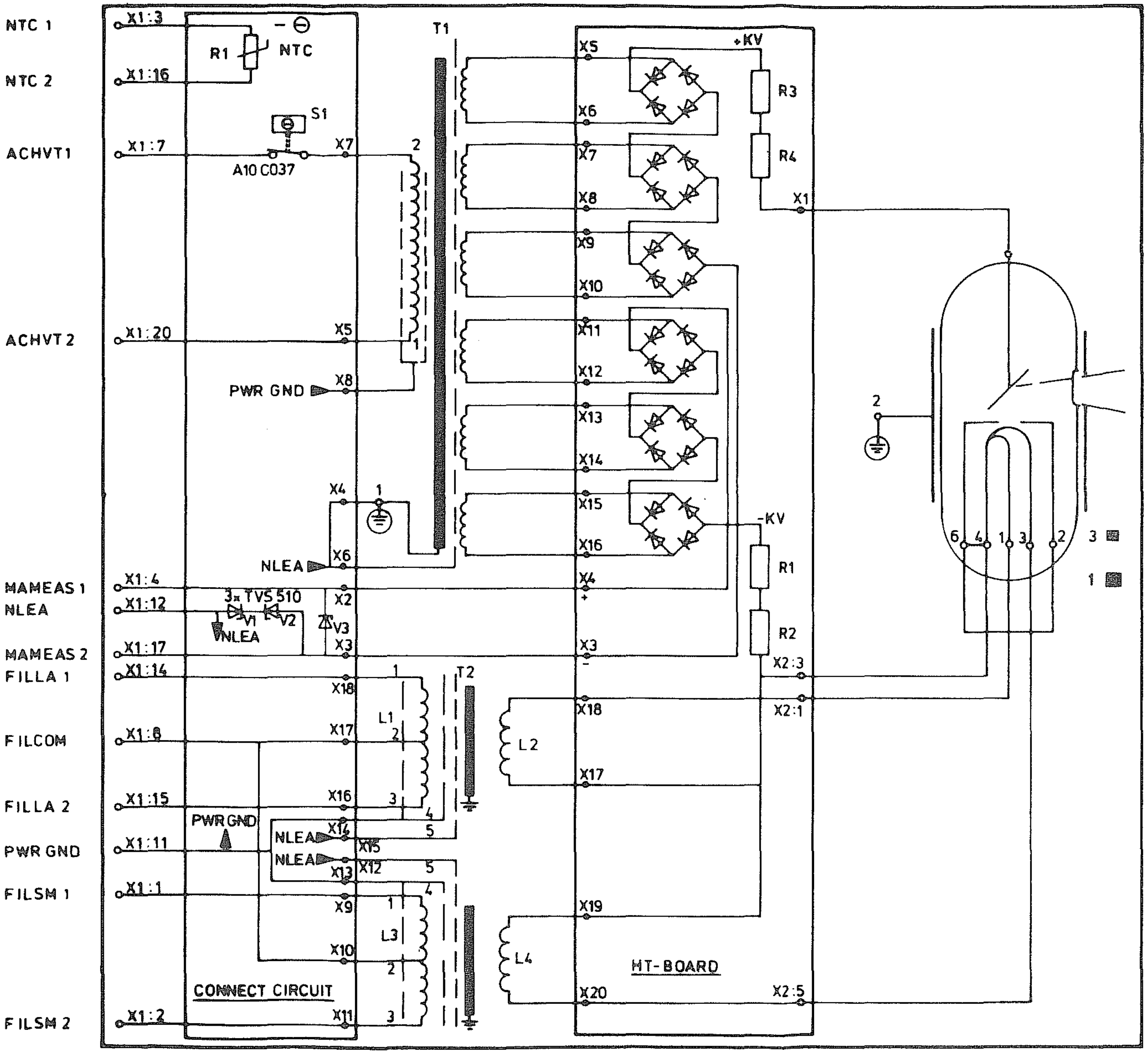
Aufgrund behördlicher Vorschriften ist es nicht erlaubt, die Röhre auszuwechseln.

Wenn der Tank defekt ist, soll er von einem Neuem ersetzt werden.

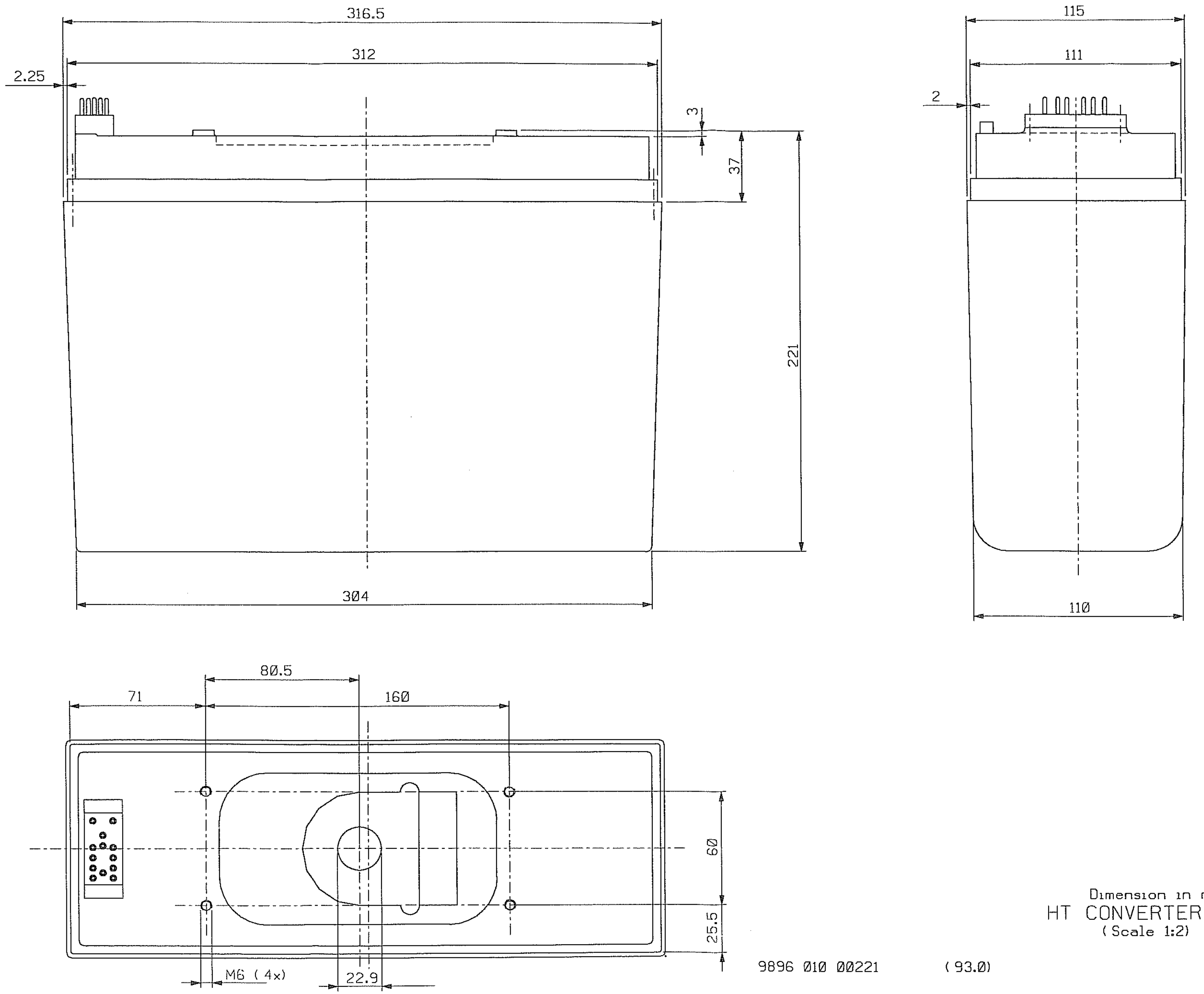
Die Identifikationsschilderund das Schild mit dem Fabrikationdatum, welche zusätzlich mitgeliefert sind, befestigen an der zentrale Stelle markiert "I" von dem mobielen chirurgischen Stativ.

ANMERKUNG

Wann der Tank defekt ist innerhalb 1 Jahr nach Installation können Sie diesen Tank zurücksenden mit einem "Questionnaire"-Formular. Für Rücksendung des defekten Tanks, benutzen Sie die Verpackung des neuen Tanks.



CIRCUIT DIAGRAM GA



Dimension in mm
HT CONVERTER TANK
(Scale 1:2)

9896 010 00221 (93.0)

These ERRATA are only applicable to monitors with the basic board WN10 with code number > 4522 167 00274. After all modifications are implemented, the board will be modified upto level 4522 167 00276. Please mark the board accordingly.

Location of relevant parts on board WN10 are indicated through the diagram on page 4 of this errata. Exact positions can be found, using the lay-out diagram in the manual, page Z3-1.1.

PHENOMENON 1

Only applicable for monitors with a Ring-shaped Mains Transformer mounted. Due to the much lower internal resistance of this type of transformer, the switch mode HV supply is not stable enough and creates a visible disturbance in images. The disturbance shows as a small ripple mark in vertical lines.

Solution

- Replace C83 (value 100 nF) with 22 nF, 12NC 2222 344 51223.
  C83 can be found in location B4 on diagram Z3-1.3. For the approx. position of C83 on the board see the diagram on page 4 of this errata.
- Replace R98 (value 100 kΩ) with 392 kΩ, 12NC 2322 156 13924.
  R98 can be found in location B2 on diagram Z3-1.3. For the approx. position of R98 on the board see the diagram on page 4 of this errata.

This modification to be checked for and executed if necessary.

PHENOMENON 2

Sometimes a horizontal disturbance, with SLR video only, can be seen.

Solution

- Replace R115 (value 2,2 MΩ) with 3,3 MΩ, 12NC 2322 242 83325.
  R115 can be found in location A2 on diagram Z3-1.3. For the approx. position of R115 on the board see the diagram on page 4 of this errata.

This modification is only to be implemented when the phenomenon occurs.

PHENOMENON 3

At the outer left side in a screen with text, a part of the characters may be partly highlighted (vertically only).

Solution

- Replace R49 (value 27,4 kΩ) with 22,1 kΩ, 12NC 2322 156 12213.
  R49 can be found in location C4 on diagram Z3-1.2. For the approx. position of R49 on the board see the diagram on page 4 of this errata.

This modification is only to be implemented when the phenomenon occurs.

PHENOMENON 4

After large video-signal changes (black to white or v.v.) a black band effect might be visible (also after blanking to high white signal).

Solution

- Remove from the tube-socket board capacitor C6 (value 22nF).
  Use page Z3-3 of the manual to locate C6. Its is closely located to coaxial connector X2 on the tube socket board.
- Replace R14 (value 1 kΩ) on the tube socket board with 5,11 Ω, 12NC: 2322 156 15118. Use page Z3-3 of the manual to locate R14.
  R14 is located next to coaxial connector X2 on the tube socket board.

- Remove from the basic board R133 (value 3,92 kΩ) and C47 (value 100pF)
  R133 can be found in location A4 on diagram Z3-1.2. For the approx. position of R133 on the board see the diagram on page 4 of this errata.
  C47 can be found in location B4 on diagram Z3-1.2. For the approx. position of C47 on the board see the diagram on page 4 of this errata.

- Replace R168 (value 3,92 kΩ) with 6,81 kΩ, 12NC 2322 156 16812.
  R168 can be found in location A4 on diagram Z3-1.2. For the approx. position of R168 on the board see the diagram on page 4 of this errata.

- Add C101 and C102 (22nF), 12NC 2222 344 51223:
  C101 between D2:4 and D2:2
  C102 between D3:4 and D3:2
  D2 and D3 can be found in location A3/B3 on diagram Z3-1.6. For the approx. position of D2 and D3 on the board see the diagram on page 4 of this errata.

Implement these modifications only when the described phenomenon is observed.

PHENOMENON 5

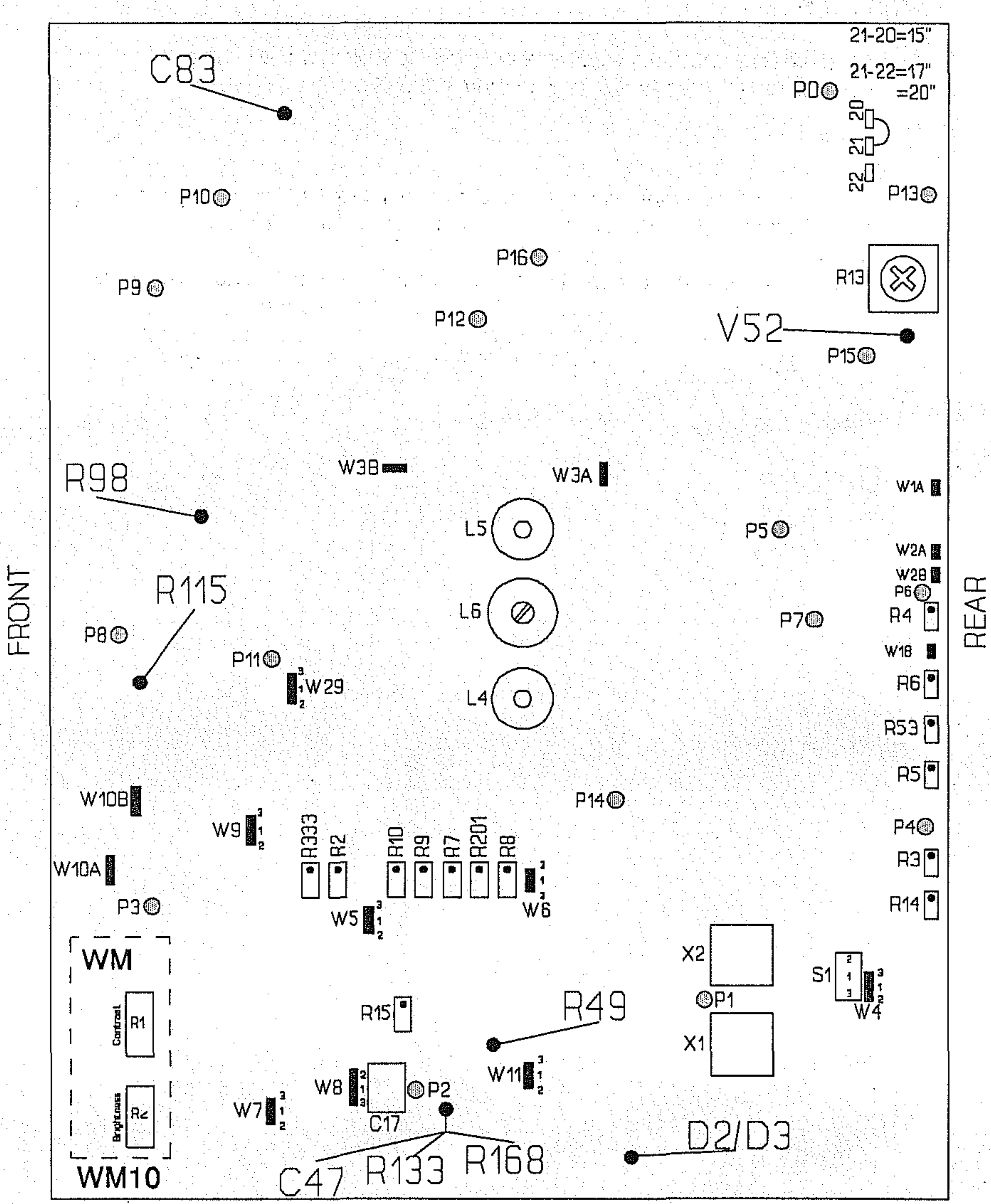
It is not always possible to achieve optimal focussing of the image.
(The focussing potmeter will be completely CCW.)

Solution

- The focussing adjustment voltage range can be set to o.a. -75 Volt by removing diode V52 from the basic board. Re-adjustment of focussing will be required with R13.
  V52 can be found in location B4 on diagram Z3-1.4. For the approx. position of V52 on the board, see the diagram on page 4 of this errata.

Perform this action only if focussing is not optimal and remarks are made by the user(s).

COMPONENT-SIDE VIEW



Approx. Component Positions for the Errata

HM(R)17S 17" TV Monitor

9807 753 (0/1)..01

9896 010 022(0/1)1

744

HM(R)17S 17" TV Monitor 9807 753 (0/1)..01 and 9896 010 022(0/1)1

<u>FILING INSTRUCTIONS</u>

File this documentation in binder
XTV of the Subsystem Documentation
IMAGE DETECTION AND DISPLAY

SERVICE MANUAL-UNIT

HM(R)17S 17" TV Monitor

9807 753 (0/1)..01

9896 010 022(0/1)1

For serial numbers, see list of pages and drawings

WARNING
TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO WET LOCATIONS. SEE ALSO SAFETY INFORMATION FOLLOWING THIS PAGE.

This manual contains descriptive information on the equipment identified by the typenumber as stated above.

IPSC: Best

1. SERVICE SAFETY INFORMATION

1. All work on the exposed monitor chassis shall be performed by qualified service personnel only. No work should be attempted without carefully consulting this manual.

2. The rotatable version of this monitor has a rotation motor and a motor drive p.c.b. which are connected to the mains supply.
   In case of servicing those units an isolation transformer should always be used.

3. It is advised to ground the chassis during any service handling. Check the interconnection of the two earth screws (safety earth and functional earth) located at the back side of the monitor behind the back cover.
   When working on the exposed chassis use only one hand during testing to avoid severe electrical shock.

4. As rough handling of the picture tube may cause implosion it should be handled with great care.
   The use of safety goggles and protective gloves is strongly advised.
   Replace the picture tube only with the type Philips M41EAA27WW dark tinted picture tube; see also clause 9.

5. As possibly danger of personal injury might result from unnecessary exposure to X-ray radiation generated by the picture tube, prolonged exposure at close range to unshielded areas of the picture tube should be avoided.

6. In case of repair, always switch off the monitor first.
   After switching off, wait at least 30 seconds, because the monitor has a self-discharging Cathode Ray Tube which takes 30 seconds to discharge.
   The only electrical parts of the monitor that may be exchanged are printed circuit boards.
   After exchanging printed circuit boards which might influence the high voltage of the monitor, the value of this voltage shall be checked to be 19 ± 1 kV.
   If a deviating value is found, it shall be corrected by adjusting R8, R7 and R201 on WM10 along the lines of the test instructions.

7. After exchanging PCB's in the supply unit, check the voltage on X1:1 to be $+120 \pm 1$ Volt.
   If a deviating value is found, readjust R1 on WM20.
   Use only an isolated screw driver.

8. The monitor is supplied connected for 220 V mains supply only.
   The mains cord, being a part of the cable harness (see Z2-2: cable harness) must be connected according to the relevant System Documentation.
   The mains cord contains 3 wires. Their colours indicate the following:
   GREEN (GN) : SAFETY EARTH
   BLACK (BK) $\left.\right\}$
   WHITE (WH) $\left.\right\}$: 220 Vac

9. The monitor shall be installed at least 6 feet (1,83 m.) beyond the perimeter of the patient's bed, or table etc., and at least 7,5 feet (2,29 m.) above the floor.

10a. All components, indicated on the schematics with ⚠ have safety functions.

   They may only be replaced by components having exactly the same properties. This can only be guaranteed if components of the same manufacturer or supplier are used.

10b. Normal repair of the monitor shall be carried out by exchanging complete Printed Circuit Boards.
   If repair on a Board is unavoidable, refer to manufacturer's parts list for safety critical components as mentioned under 10a.

11. When mounting the cable harness (code nmbr.: 9807 750 31101), make sure the protective sleeve of the harness does not stick into the monitor for more than 1 cm.
   Lengths of cables from the cable harness inside the monitor must be kept as short as possible. Cables should be drawn back if, e.g. during transport, the sleeve has been shifted too much.

12. Before returning the serviced monitor to a client or before putting it into operation at least the following safety tests should be performed:

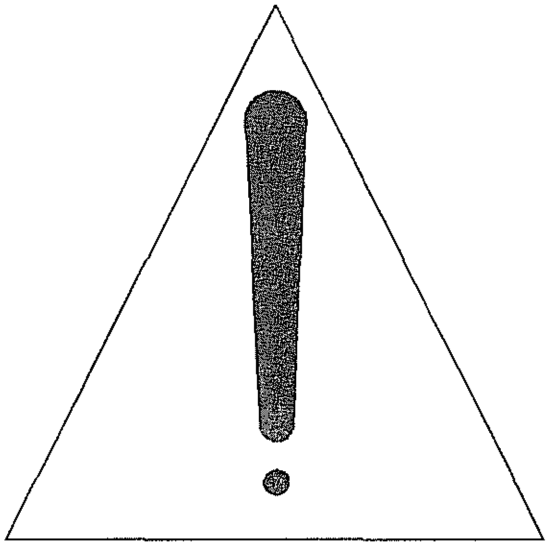
    a. Earth continuity test:
    An ohm meter is used to measure the *resistance between each separate* accessible metal part and the earth connection of the mains inlet.
    All measured values should be $\leq$ 0,1 Ohm.

    b. Earth leakage test:
    An AC meter with an impedance of 1500 ohm, shunted by 0,15 µF is connected between the safety earth screw and the earth connection of the wall outlet.
    During this measurement the monitor may not be connected to the mains earth connection.
    The measured value should be $\leq$ 0,7 Volt.

    WARNING

    In case of a defect in the monitor, the enclosure may be under voltage stress, if the measured voltage is over the indicated value.

13. This monitor is supplied with 2 fuses, 2 spare fuses and a copper bar.
    When using the monitor with a mains plug which can be reversed, both phase and neutral must be fused.
    In all other cases only the phase (L) must be fused and the copper bar must be inserted into the neutral (N) fuseholder. If not indicated, to be determined by measuring with a low impedance ohm measuring device, or voltage measuring device. (IEC 601).



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing)instructions in the literature accompanying the appliance.

An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.

SERVICE MANUAL UNIT
HM(R)17S 17" TV MONITOR
TYPE NR: 9807 753 (0/1)..01 and 9896 010 022(0/1)1

SERIAL NR:

Manual codenumber: 4522 983 49091

LIST OF PAGES AND DRAWINGS

Section A: INTRODUCTION AND TECHNICAL DATA

Contents

1. GENERAL

1.1. SCOPE OF PRODUCT

This section describes the performance of a high resolution dual standard TV monitor for display of monochrome video signals.
The monitor is considered to be a segment of an X-ray TV system.
Styling is in correspondence with this environment.
The 50Hz version has code nrs. 9807 753 0..01 and 9807 753 8..01, while the 60Hz version has code nrs. 9807 753 1..01 and 9807 753 9..01 for rotatable versions. The non-rotatable versions have code nrs. 9896 010 02201 and 9896 010 02221 for 50Hz and 9896 010 02211 and 9896 010 02231 for 60Hz.
The rotatable monitor types have image rotation (by rotation of the deflection coil), while all monitors have ambient light controlled brightness and contrast, clickpositions for brightness and contrast and automatic switching of line rate (Standard or High-line).
The product is a non-dividable functional unit. All properties can be easily verified.

1.2. BASIC PROPERTIES

The monitor is equipped with a 17 inch high resolution dark tinted, antiglare (direct grind) picture tube M41EAA27WW, deflection angle 110 degrees.
The monitor will accept both standard TV signals and high resolution signals. Switching over is done automatically.
Without an input signal the monitor will switch to low lines.
In the high resolution mode, an aspect ratio of 3:4 or 1:1 can be selected by internal jumpers. After changing the aspect ratio readjustment of the picture width and geometry will not be necessary.
The monitor can display 100/120 Hz pictures by internal jumpering. Readjustment of picture height will be necessary after changing jumper setting.

The application area of the 17" monitor will be in medical diagnostic imaging systems.

2. DEFINITION OF TERMS

- STANDARD SIGNALS are video signals that comply with CCIR or EIA broadcast standards.

- NON-STANDARD SIGNALS are video signals that do not exactly meet the CCIR or EIA standard. Possible deviations are:
  - o absence of equalizing pulses
  - o line and frame frequency, up to max. +/- 4%
  - o set up levels
  - o fall and rise times of synchronization pulses
  - o non-standard ratio of video/sync.

3. TECHNICAL REQUIREMENTS

3.1. OPERATIONAL PERFORMANCE

3.1.1. Electrical

- <u>Power</u>

Supply voltage : 220 V ± 10%
Frequency range : 48-62 Hz
Input power : ca. 70W
CRT high voltage: 18.5 ± 1 kV at zero beam current.
Breathing < 2% from zero to max. beam current.

- <u>Video Amplifier</u>

. The monitor will accept the following input signals:
- Standard signals CCIR or EIA.
- Non-standard signals with the line and field frequency within the range of CCIR or EIA.
- High resolution signals 1249 lines 50 Hz or 1049 lines 60 Hz.
- Signals with 100 or 120 Hz field frequency (line frequency 32 KHz).
- Separated video and composite synchronization pulse.
- Signals from VCR and VTR.

. Input level
- Composite video: 0.5 Vpp to 2 Vpp. Nominal 1 Vpp.
- Video 0.35 Vpp to 1.4 Vpp; Sync. 0.15 Vpp to 0.6 Vpp.

. Ratio peak video/sync.: max. 4.5

. Frequency response maximal deviation from a flat characteristic:
- Up to 20 MHz -1 dB to +1 dB.
- At 25 MHz <= -3 dB.

. Tilt
- Tilt on 50 Hz square wave <= 5%
- Tilt on line frequency square wave <= 5%
- Overshoot on 250 kHz square wave <= 5%

Figures defined at 100 cd/m² peak white level.

. Hum
50% added hum at nominal video level will give no significant picture disturbance.

- Horizontal Deflection

Nominal line frequency 15680 Hz or 31350 Hz.
Synchronization lock and hold: 4%
Flyback time : max. 6.5 µS
Stability of amplitude : better than 2% of picture height.

- Vertical Deflection

Synchronization: 48 Hz to 62 Hz or
96 Hz to 124 Hz.
Stability of amplitude: better than 2% of picture height.

- Dynamic Focus

Horizontal and vertical dynamic focus is applied.

3.1.2. CRT

- Display Size

243 x 243 mm or 243 x 324 mm

- Aspect Ratio

In Low Line Rate mode an aspect ratio of 3:4.
Internal jumper selectable aspect ratio in High Line Rate mode; 1:1 {for XTV5 and XTV6 (9807 733 5/6..01)} or 3:4 {for XTV6 (9807 736 7..01) and higher}, without the need for readjustments.

- Interlace Factor

Better than 45:55.

- Geometry

Inside monitor circle better than 1% of picture height; 2% for rotatable version.
Outside monitor circle 2%.

- Resolution

Modulation of 20 MHz bars in the centre >= 20% (high line rate).
Modulation at 500 kHz is 100%.

- Positional Hum

Peak to peak displacement is less than 0.2% of picture height.

- Picture Position

The theoretical centre of the monitor circle is centered to the displayed area with a maximal deviation of 1% of the picture height.
During a full rotation the maximal allowed swing of the monitor circle is 3.5 mm.
After switching from low to high line rate or back, an additional shift of 1% is allowed. This is only valid if for the input sync. the ratio (front porch + sync. pulse width) / blanking width is the same for both high and low line rate.

- Black level

With the black level adjusted to 4 cd/m² this level will be reached within 10 minutes.
From picture appearance until stabilization the level will be <= 10 cd/m².
Drift versus temperature: <= 2 cd/m² over operating temp. range.
Change due to 50% white at 250 cd/m²: <= 5 cd/m².
Black level luminance : max. >= 15 cd/m²
equivalent min. <= - 50 cd/m².

- White level

front control:
dark tinted picture tube: max. 600 cd/m²
min. equal to black level.

- Picture height stability

In all normal operating conditions, including empty tape play back, the picture dimensions shall not drop below 70% of the useful screen dimensions.

- Deviations after switching line rates

Switched from low line rate to high line rate:
change in white level: < 10 cd/m²
change in black level: < 2 cd/m²
change of picture position: < 1%.

- Breathing

  Breathing < 2% from zero to maximal beamcurrent.

- Ambient light controlled brightness and contrast levels

  Click stops on brightness and contrast control are factory set to allow the optimal control settings to be easily reinstated, if they should be disturbed.

- Control at ambient light levels between 1 and 1000 lux.
- *Control characteristics jumper selectable,* depending on application.
- Wide field of view optical sensor.

3.1.3. Mechanical

The monitor consists of a plastic cabinet.
Mounting facilities for a cushion / handgrip are provided.
All connectors are located inside the monitor.
Overall dimensions height x width x depth :
365 x 405 x 350 mm.
Weight: approx. 24.5 kg.

3.1.4. Compatibility

- The monitor is compatible with the following systems:

  o TV CHAIN XTV4
  o TV CHAIN XTV5
  o TV CHAIN XTV6
  o TV CAMERA XTV8
  o TV CHAIN XTV11
  o DCI systems
  o DVI systems
  o DSI systems
  o VCR and VTR

3.2. MAINTENANCE AND LOGISTICS

- *Several measures have been taken to assure* good serviceability:
  o Printed circuit boards can easily be exchanged.
  o Good accessibility for measuring purposes.
  o Easy exchange of picture tube.

3.3. OPERABILITY

3.3.1. Reliability

MTBF: 15000 hours excluding picture tube, picture tube 24000 hours.
MTTR: 0.5 hours
Economic life: 7 years

3.3.2. Operational Environment

Temperature range (in C.) :
+10 to +40 degrees during operation
-25 to +70 degrees during transport

Humidity:
max. 90% during operation

Mains supply:
The monitor will show no significant picture deterioration under the following conditions:
Mains voltage drops of 25% during 10 ms.
Mains voltage drops of 100% during 1 ms.
Spikes of 500 V on mains voltage according to UXW 13850.

No defects may occur due to voltage spikes of 1000 Vpp according to UXW 13850.

3.4. DESIGN CONSTRAINTS

Applicable Standards and Regulations

- Safety

  IEC 601-1
  AP requirements only applicable for remote control functions
  UL 1410
  CSA C22.2

- Electro Magnetic Compatibility

  EMC behaviour in accordance with UXW 13850
  UXW 13850 covers VDE 0871 (level B)
  VDE 0875 (level N)
  FCC rules

- X-ray Radiation

  The monitor complies with: DHHS
  NH+W
  Röntgenverordnung

- Mechanical Environment :

  M1 - Acc. to UXW 13600 -

- Climatic Environment :

  C1 - Acc. to UXW 13600 -

4. INTERFACES

2 BNC connectors for video with loop-through facility. When no loop through is required (75 Ohm termination), the second BNC connector can be used for external composite synchronization or parking a second video cable.
1 DIN plug and 1 MOD connector for remote control of rotatable scan system.
1 9-pin D connector for remote control of brightness and contrast (when applicable).
Mains: 3 flat pins IEC connector for mains cord.
Video earth / mains earth connection with strip.

5. OPERATION

Click position for default setting of brightness and contrast adjustment by knobs at the front of the monitor.

For flawless functioning of automatic brightness / contrast control both potentiometers must be in their click position.
All other adjustments are located inside the monitor and are not user operated.
For rotatable scan control: 3 switches for left-, right rotation and zero position are provided.

5.1. FUNCTIONAL DESCRIPTION

For the rotatable monitors there is the possibility of rotating the image in any desired position. Rotating can be done either by three pushbuttons on the front of the monitor, or by remote control.

5.2. PERFORMANCE

- Mains voltage: 220 Vac 50 Hz or 60 Hz only.
- Rotation control:
  - o 3 pushbuttons on the front for left, right and zero.
  - o Remote control via a 10 pole MOD connector (WM60:X1) or 6 pole DIN plug (WM60:X7).
- Zero position: Maximal deviation from the nominal zero position ± 5 degrees.
  When switching on, the image automatically moves to this position.
- Rotation time: circa 10 seconds.
- Picture position: An extra deviation of the picture position in a rotated position is allowed.
- Operation of the image rotation mechanism shall not generate any visible disturbance in the image.

5.3. DESIGN CONSTRAINTS

Apart from standards and regulations mentioned in 3.4 the remote control connections also meet the AP requirements.

6. MONITOR SCREEN CLEANING

Use for cleaning the monitor screen a soft cotton cloth moistured with water and soft soap.

Section :B INSTALLATION

Contents

1. CABLE ASSIGNMENTS

WM10:X1 Video IN termination at 75 ohm via switch WM10:S1 if not looped through
:X2 Video OUT (Loop Through) or External Synchronization or for parking a second video cable.

NOTE

With cable harness 9807 750 31101 two video cables are provided.
If a second monitor or loop through situation is not needed the second video cable can be parked at WM10:X2, provided that WM10:X2 is disconnected from the circuitry by switching S1 to the right, as seen from the rear, and putting W4 on 1-2.

WMX1 220 Vac Mains
WM1 yel/grn Ground
WM60:X1 MOD connection for remote control of rotation system.
:X7 DIN connection for remote control of rotation system.
:X8 D connection for remote control of brightness and contrast levels.

NOTE

Above cables are integral part of cable harness 9807 750 31101.

---

2. DISMOUNTING AND MOUNTING OF THE CABLE HARNESS

- Remove the cable harness from the clamp by pulling the harness backwards (away from the monitor housing).
- Loosen the four screws at the rear and remove back cover.
- Now, the cable harness plus strain relief clamp can be loosened by lifting up the clamp a little.
- This clamp exists of two clamp halves, one clamp cover and a plug. Those parts are attached to each other by four screws M3x20.
- By removing those four screws the parts can be taken apart and in this way the clamp can be removed from the cable harness.

NOTE

The second hole is for looping-through possibilities, if not used the second hole must be covered with the delivered plug.

Mounting of the cable harness takes place by carrying out the actions mentioned above in the reversed order.

IMPORTANT

- Make sure the protective sleeve of the harness does not stick into the monitor for more than 1 cm. Lengths of cables from the cable harness inside the monitor must be kept as short as possible. Cables must be drawn back if, e.g. during transport the sleeve has been shifted too much.
- If applicable :
  the guiding of the cable harness must be such that, independent of the position of the monitor, the protective sleeve always stays at least 92 cm above the floor.

Section C: SETTING TO WORK

Contents

1. GENERAL

- Check and ensure all plugs are in (the right) place, and programming is accomplished according to the installation.

- Connect mains supply, apply VIBS signal, terminate with 75 ohm, and check the image for cosmetics.

- Brightness and contrast control are factory adjusted for correct settings, with front control potentiometers in click position. However, in some applications the user might prefer a different setting.
  When using the Automatic Brightness and Contrast control (ABC) (WM10:W5 in on position), it is important to bear in mind, that a deviation from the click position influences the correct behaviour of the ABC. There are limited possibilities to correct this:

  a) Contrast up or down without changing brightness.

  b) Slightly bringing Brightness down and putting jumper W8 in position 1-3.

  c) Brightness down, Contrast up and putting jumpers W7 + W8 in position 1-3.

- If ABC control is not desired (WM10:W5 in off position), adjust brightness and contrast levels as follows: under normal light conditions: first apply image then turn brightness and contrast (front controls) counter-clockwise. Turn brightness up until image just becomes visible. Then turn contrast up to a desired value.

- In most cases this will be the extent of the adjustments. A list of switches, jumper settings and potentiometers with the effects of their adjustment has been included if the need for further adjustments are required.

OVERVIEW of switches, jumpers, potentiometers, capacitors and coils with the effect of their adjustment.

For board 4522 167 00273

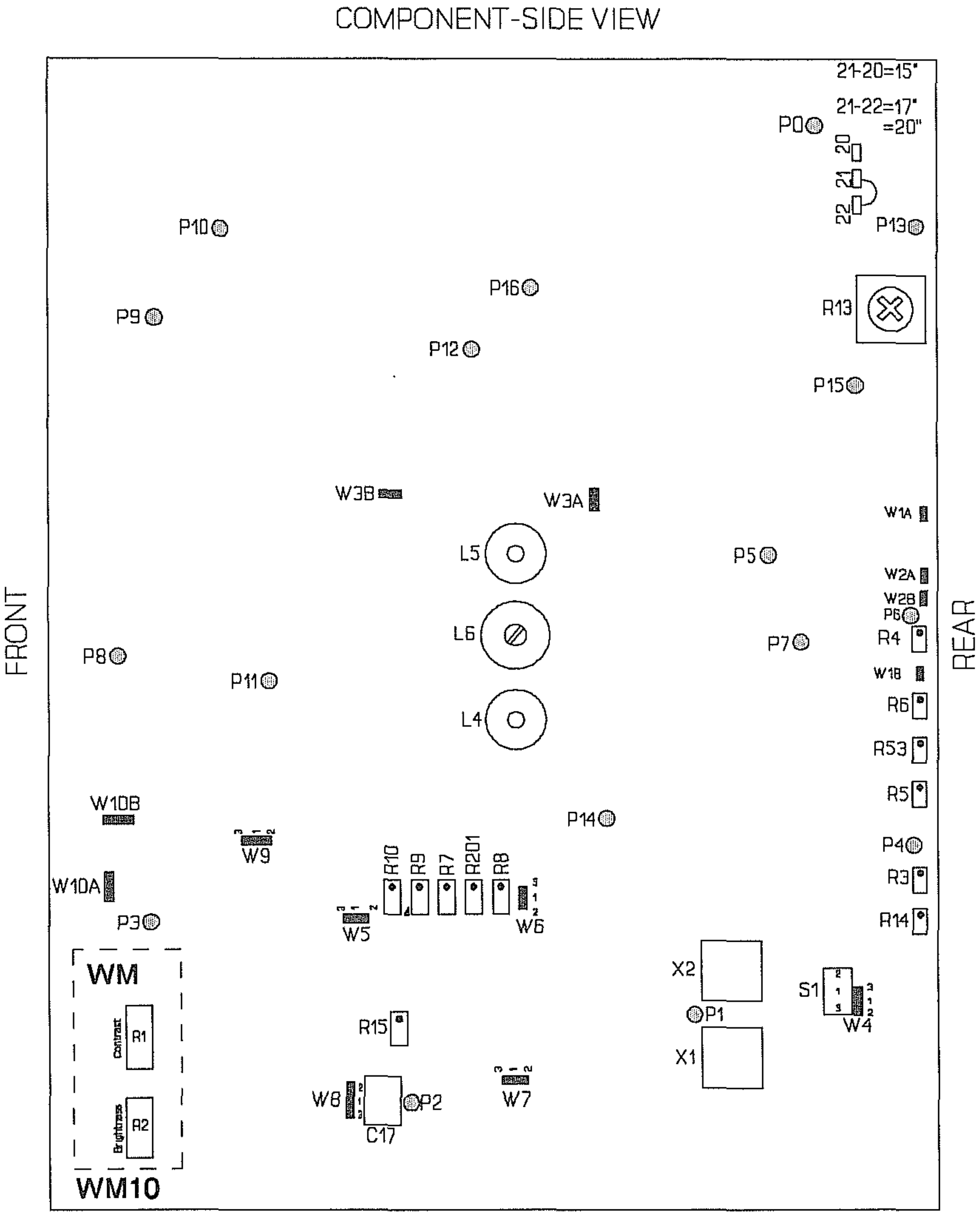
Name	Position	Function
WM10: S1	1-2	Terminates WM10:X1 with 75 ohm. With WM10:W4 on 1-2, WM10:X2 is suitable for
		parking a second video cable.
		With WM10:W4 on 1-3, WM10:X2 is suitable for a separate sync. input (if applicable).
		Loop through (WM10:X1 = WM10:X2), WM10:X1 not terminated.
	1-3	
		Double frame frequency
WM10: W1A		Normal frame frequency
W1B		Double frame frequency
W2A		Normal frame frequency
W2B		3:4 scan ratio High Line rate
W3A		1:1 scan ratio High Line rate
W3B		Sync. from VIBS at WM10:X1
W4	1-2	Separate sync. input at WM10:X2 (terminate externally !)
	1-3	LDR switched off
W5	1-2	LDR switched on
	1-3	1:1 scan ratio High Line rate
W6	1-2	3:4 scan ratio High Line rate
	1-3	Ambient Light Dependent Contrast Control : Standard
W7	1-2	Ambient Light Dependent Contrast Control : Low
	1-3	Ambient Light Dependent Brightness Control : On
W8	1-2	Ambient Light Dependent Brightness Control : Off
	1-3	Automatic High / Low Line selection or fixed High Line
W9	1-2	Fixed Low Line (in combination with WM10:W10)
	1-3	Fixed High Line
W10A		Automatic High / Low Line selection or fixed Low Line
W10B		(in combination with WM10:W9)
		Contrast adj. (front panel)
WM: R1		Brightness adj. (front panel)
R2		Maximum H.T. adj. (21 kV)
WM10: R3		Vertical linearity
R4		Vertical shift
R5		Low Line height adj.
R6		High Line H.T. & image width adj. for 1:1 scan ratio
R7		Low Line H.T. & image width adj.
R8		Horizontal shift
R9		Line (Hor.) time adj. (64.0 or 63.5 μsec)
R10		Centre focus
R13		G1 adjust
R14		Cathode adjust (white limiting)
R15		High Line height adj.
R53		High Line H.T. & image width adj. for 3:4 scan ratio
R201		
		Frequency correction (minimal overshoot video)
WM10: C17		Low Line horizontal linearity
L4		High Line horizontal linearity
L5		Low Line image width
L6		
WM20: R1		+120 volt adj.
WM30:		No adjustments
WM60:		No adjustments

OVERVIEW of switches, jumpers, potentiometers, capacitors and coils with the effect of their adjustment.

For boards ≥ 4522 167 00274

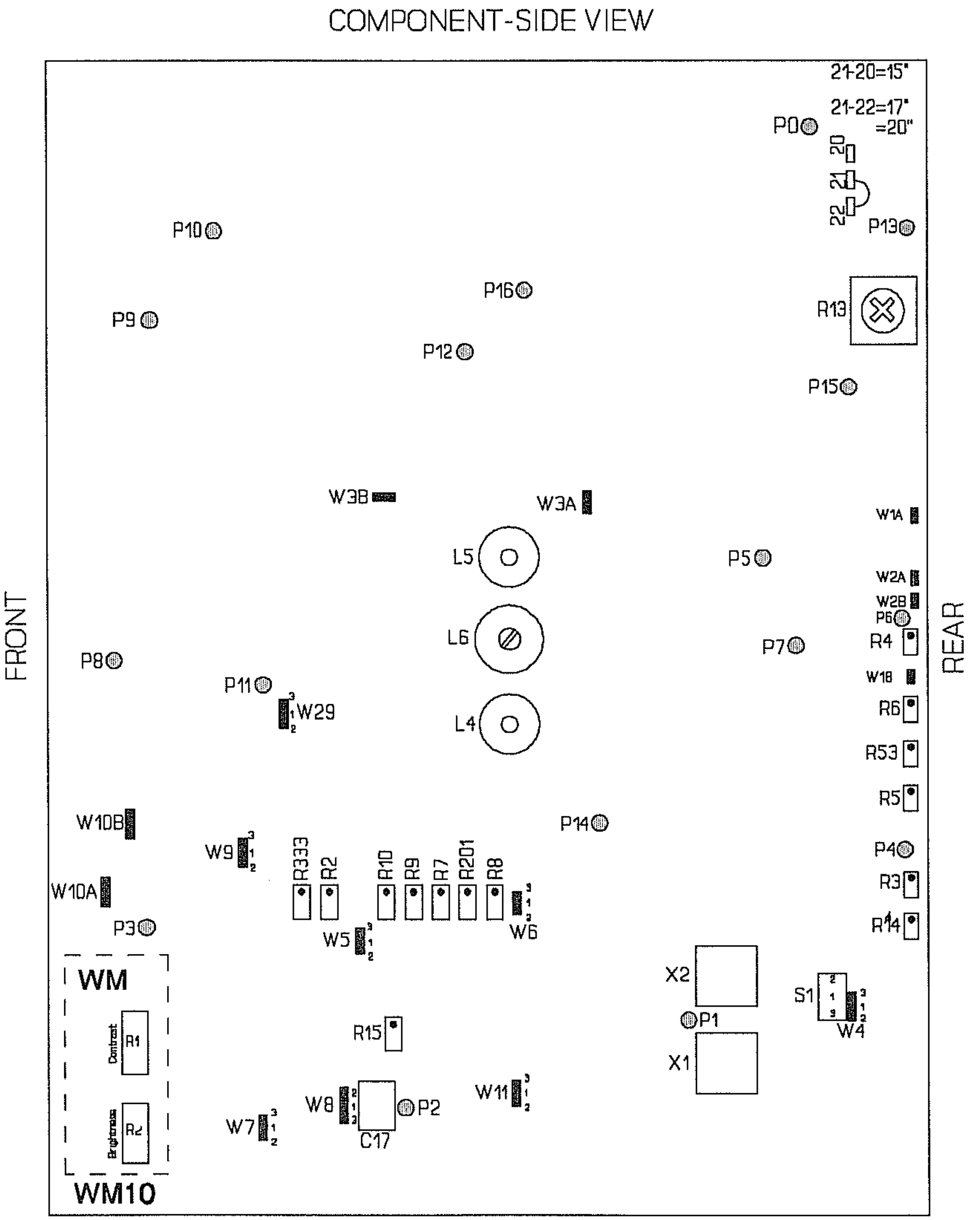
Name		Position	Function
WM10:	S1	1-2	Terminates WM10:X1 with 75 ohm. With WM10:W4 on 1-2, WM10:X2 is suitable for parking a second video cable. With WM10:W4 on 1-3, WM10:X2 is suitable for a separate sync. input (if applicable).
		1-3	Loop through (WM10:X1 = WM10:X2), WM10:X1 not terminated.
WM10:	W1A		Double frame frequency
	W1B		Normal frame frequency
	W2A		Double frame frequency
	W2B		Normal frame frequency
	W3A		3:4 scan ratio High Line rate
	W3B		1:1 scan ratio High Line rate
	W4	1-2	Sync. from VIBS at WM10:X1
		1-3	Separate sync. input at WM10:X2 (terminate externally !)
	W5	1-2	LDR switched on
		1-3	LDR switched off
	W6	1-2	1:1 scan ratio High Line rate
		1-3	3:4 scan ratio High Line rate
	W7	1-2	Ambient Light Dependent Contrast Control : Standard
		1-3	Ambient Light Dependent Contrast Control : Low
	W8	1-2	Ambient Light Dependent Brightness Control : On
		1-3	Ambient Light Dependent Brightness Control : Off
	W9	1-2	Automatic High / Low Line selection or fixed High Line
		1-3	Fixed Low Line (in combination with WM10:W10)
	W10A		Fixed High Line
	W10B		Automatic High / Low Line selection or fixed Low Line (in combination with WM10:W9)
	W11	1-2	Normal mode (1100mV)
		1-3	DCAS mode (700mV)
	W29	1-2	VCR mode
		1-3	Normal mode
WM:	R1		Contrast adj. (front panel)
	R2		Brightness adj. (front panel)
WM10:	R2		Horizontal shift HLR
	R3		Maximum H.T. adj. (21 kV)
	R4		Vertical linearity
	R5		Vertical shift
	R6		Low Line height adj.
	R7		High Line H.T. & image width adj. for 1:1 scan ratio
	R8		Low Line H.T. & image width adj.
	R9		Horizontal shift
	R10		Line (Hor.) time adj. (64.0 or 63.5 μsec)
	R13		Centre focus
	R14		G1 adjust
	R15		Cathode adjust (white limiting)
	R53		High Line height adj.
	R201		High Line H.T. & image width adj. for 3:4 scan ratio
	R333		ABC adjustment
WM10:	C17		Frequency correction (minimal overshoot video)
	L4		Low Line horizontal linearity
	L5		High Line horizontal linearity
	L6		Low Line image width
WM20:	R1		+120 volt adj.
WM30:			No adjustments
WM60:			No adjustments

Component view of basic board WM10



4522 167 00273

Component view of basic board WM10



4522 167 00274

Section : F Corrective Maintenance

Contents

Illustrations and Drawings

1. INTRODUCTION

1.1. TOOLS

- Oscilloscope >15 MHz) with TV triggering and delayed time base.
- Lightmeter (recommended measuring devices: MAVO MONITOR(Gossen),or MINOLTA LS(110).
- Digital Multimeter plus High tension probe (recommended device: PM 9246/03)

1.2. GENERAL

The basic board WM10 is not preadjusted in the factory, so when replacing this board it has to be fully adjusted, see paragraph 2.1 for the procedures.

After each repair in the monitor, the maximum high tension adjustment mentioned in 2.1.2 must be carried out (legal requirement).
Fuse WM20:F1 may only be replaced by one of exactly the same type, which can be ordered under code nr. 2422 086 01042 (1A-SB-250V).

In case of mounting a new deflection coil or a new monitor tube (CRT), also the adjustment mentioned in 2.2 (Deflection) must be carried out, together with the adjustments in 2.1!

All adjustments are to be done on WM10 unless otherwise specified.

Indications on direction of turning WM:R1 and WM:R2 are as seen from the front of the unit.

2. ADJUSTMENT PROCEDURES

2.1. BASIC BOARD

The adjustments have to be done with video signals applied from the system in which the monitor is used. Otherwise it may be necessary to readjust V-shift and H-shift after installation of the monitor in the system.

Use the video signal coming from the TV-chain (VIBS).

NOTE

If not present, mount a WM10:R1/R2 support on the basic panel and connect plug WM10:X11.

NOTE

A spare fuse WM20:F1 (2422 086 01042) is needed for the HT adjustment.

Mechanical adjustment of potmeters contrast R1 and brightness R2.
Before placing a new basic board WM10, adjust the two potmeters brightness WM:R2 and contrast WM:R1 mechanically. Fix the ring around the axis with the hexagonal screw. If it is difficult to turn the potmeter, loosen the nut which presses the drum against the ring. Adjust the drum with a screwdriver, to make turning easier. Fix the drum with the nut. Return the ring to the "click" position. Loosen the hexagonal screw to allow the potmeter to turn whilst the ring is held in the "click" position by the drum.

Plugs, jumpers and potmeters
- Check whether all plugs are in (the right) place.
- Turn all potmeters on basic panel WM10 in their mid-position, including R1 and R2 at the front of the monitor, except for R3, R7, R8 and R201: Turn R3, R7, R8 and R201 completely counter-clockwise.
- Check whether all jumpers are in the right place. (see page F-9 or page F-10)

- Jumper positions (WM10) :
  - W1, W2 in position B;
  - W3 in position A;
  - W4 in position 1-2;
  - W5, W6, W7, W8 in position 1-3.

- Put switch WM10:S1 (1-2) to the right, as seen from the rear (75 ohm termination).
- Check : WM60:X5, WM60:X6 and WM60:X9 are *disconnected.*
- Check that a wire is connected between solder tag WM10:MP21 and WM10:MP22 (HT-kV adaptation for 17" Monitor).

Connect the monitor to the mains voltage and apply power to the monitor.

2.1.1. Free running frequency

Adjust the period time (R10), measured at measuring point 11 to 64.0 µsec for 50 Hz or 63.5 µsec for 60Hz while no video signal is being applied to the monitor.

2.1.2. High Tension

NOTE

- *An H.T.-probe is needed for this measurement.*
- *Spare fuse WM20:F1 needed.*
- *Put jumper W4 in position (1-2).*
  Leave S1 to the right. Apply the composite video signal from the TV-chain to input WM10:X1.

Hiccup circuit test
For this test an overall white image signal has to be supplied to the monitor.(700mV excl. sync.)
Measure the HT-actual voltage with the HT-probe and multimeter on the HT-cooonection on the CRT.
!! Before connecting the HT-probe, disconnect the monitor from the mains life voltage. Afterwards switch it back on !!

-1- Put WM:R1 (contrast) and WM:R2 (brightness) potmeters fully clockwise.
-2- Turn R8 clockwise until the circuit starts to hiccup (requirement < 21 kV).
-3- Turn R8 back to V-anode ≈ 19.5 kV.

Switch over to HLR using the same image signal of all white.

-1- Increase (turn clockwise) R201 until the scanwidth becomes unstable.
-2- Turn R201 back to V-anode ≈ 19.5 kV.

Maximum high tension
- Turn WM:R1 (contrast) and WM:R2 (brightness) fully counter-clockwise
- Turn R3 completely counter clockwise.
- Mount an 820 ohm resistor between measuring point 16 and 0 V.
- Adjust the High Voltage for SLR (Standard Line Rate) to 21 kV with R8.
  Measure the voltage at the high tension point on the picture tube.
- Turn R3 clockwise **very slowly**, until the fuse blows.
- Disconnect the monitor from mains.
- Seal R3, such that turning becomes impossible.
- Remove the 820 ohm resistor.
- Turn R8 a few turns (2-3) back and place a new fuse WM20:F1.
- Put jumper W4 back to (1-2)!
- Connect the monitor back to mains voltage.

2.1.3. Image geometry

Apply the video output signal (VIBS) of the TV-chain to the monitor input WM10:X1.
Put W4 in position 1-2.

Programming for the line rate
When the system applies only SLR (Standard Line Rate) or only HLR (High Line Rate) images, select SLR or HLR. When the system applies both SLR and HLR images, select automatic switching from SLR to HLR. First the monitor is adjusted for SLR and then for HLR.

The line rate can be selected by jumper setting according the table below.

line rate	jumper position	
	W9	W10
SLR	1-3	B
HLR	1-2	A
Automatic	1-2	B

HLR : High Line Rate
SLR : Standard Line Rate

MONITOR Geometry Adjustment

TIP
* Use of the transparent circle sheets on the pages F-11 + F-12):
- create a complete circle with both sheets and fix the sheets with transparent tape.
- measure the mechanical centre of the CRT screen and mark it.
- position the transparent sheets such that the centre of the circle coincides with the measured mechanical centre of the screen.
- adjustment will be easier now, but take care not to make paralax errors.

(1) Apply a monitor circle with standard line rate video to the monitor.
(2) Adjust the brightness potmeter (WM:R2) such, that the video lines become visible.
(3) Adjust the image width (R8) such, that the displayed rectangular image formed by the video lines just fits in the monitor bezel. (See figure 1) This means that all of the video information is displayed.
(4) Adjust the image height (R6) such that the raster just fits in the monitor bezel.
(5) Adjust the linearity with R4 (vertical) and L4 (horizontal) to correct distortions of the circle.
(6) Adjust the image to the centre of the bezel with horizontal-shift (R9) and with vertical shift (R5)

*** Repeat 3 through 6 until all conditions are met.

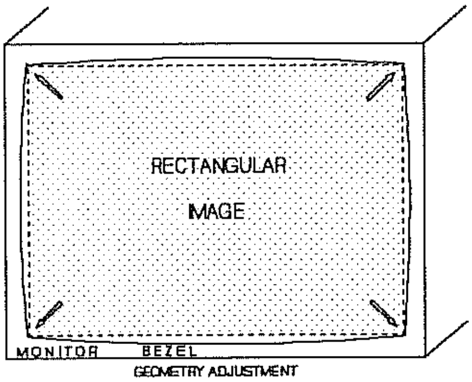


Figure 1

(7) If available in the system, apply a HLR monitor circle to the monitor.
(8) Adjust the image width (R201) so that the rectangular image formed by the video lines just fits in the monitor bezel.
(9) Adjust the image height (R53) so that the raster just fits in the monitor bezel.
(10) Adjust linearity with L5 to correct distortions of the circle.

*** Repeat 7 through 10 until all conditions are met.

The equality of the High Tension for SLR & HLR is more important than the exact equality of deflection, so repeat the adjustment of SLR High Tension with R8 and HLR High Tension with R201 as necessary.
For SLR, the image width and High Tension can also be influenced by L6.
If necessary also repeat the geometry setup steps 4, 5 and 6 for SLR and 9 and 10 for HLR.

NOTE

The adjustments for SLR and HLR are interactive (influence each other), so first adjust the monitor globally and then concentrate on meeting all conditions.

NOTE

For systems that produce HLR images of 1:1 scan ratio, program W6 to (1-2) and W3 to position B and adjust the image width for HLR with R7 instead of R201, here the HT for HLR should be 250 V lower than for SLR.

NOTE

The image geometry can also be influenced by the round magnets, around the deflection coil.

2.1.4. Focus

Adjust focussing of the image in the middle of the screen with R13, by displaying, for instance a line pair phantom, for optimal definition.

2.1.5. Video amplifier and brightness & contrast adjustment

Monitor light output must have stabilized (at least 1/2 hour after switch-on).

Loosen the rings for click positions around both the front potmeters for contrast and brightness, if this has not already been done.

Switch the LDR off by putting jumper W5 in position off. (see pages F-9 and F-10 for correct setting)

The selection of SLR or HLR is system dependent. The adjustments in the factory are done with SLR images.

(1) BRIGHTNESS CONTROL AND BACKGROUND LIGHT

- Apply composite video signal from the TV-chain to input WM10:X1.

BRIGHTNESS CONTROL ('click-position')

- Turn the contrast potmeter (WM:R1) completely counter-clockwise.
- Adjust with the brightness potmeter (WM:R2) the cathode voltage to 90 volt (see also figure 2). Connect the oscilloscoop probe to the lower end of one of the large sized resistors at the left top corner of the tube-socket board (WM30).
- **Only for non-rotatable versions :** Fix the ring of the potmeter in this position for "click". Check the click position by turning the brightness potmeter (WM:R2) a few times (the cathode voltage should return to 90V ; see also figure 2).

- **For rotatable versions:** Leave the potmeter in the adjusted position. Do not fix the "click" position yet.

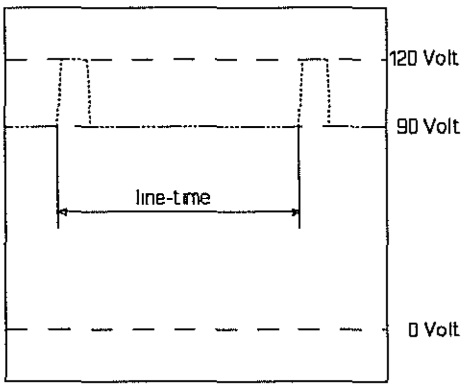


FIGURE 2 : Cathode Voltage
Figure 2

BACKGROUND LIGHT

- Leave the contrast potmeter (WM:R1) in the counter-clockwise position and the brightness potmeter (WM:R2) in the "click" or adjusted position.
- Adjust with R14 (VG1) the light output (image middle) to 1.5 cd/m² (± 0.05 cd/m²). For Integris V/H/B System Families adjust to 0.3 cd/m² ± 0.05 cd/m².

(2) WHITE LIMITING AND CONTRAST & BRIGHTNESS

For the adjustments, white limiting and contrast & brightness, apply the video signal (VIBS) of the TV-chain to the video input (WM10:X1) of the monitor. The video level measured at WM10:MP1 (video in) can be varied by varying the dose rate in the system. The level is also adjustable with the set-up potmeter in the TV-chain for lower signal levels. The system must generate an overall white monitor circle, so do not place an object in the X-ray beam. Only a 1.5 mm copper plate may be placed in the beam as long as the overall white image is not disturbed.

WHITE LIMITING

- Switch on fluoroscopy.
- Set the amplitude of the video signal at WM10:MP1 to 700mV excl. sync, by varying the dose rate. Use the X-ray collimator to create a square of approx. 4x4 cm. in the middle of the screen.
- Turn the contrast potmeter (WM:R1) completely clockwise and adjust the light output in the middle of the square to 600 +/- 5 cd/m², with the light limiting potmeter R15.

CONTRAST (**for non-rotatable monitors**)

- Switch on fluoroscopy.
- Set the amplitude of the video signal at WM10:MP1 to 700mV excl. sync., by varying the dose rate. Use the X-ray collimator to create a square of approx. 4x4 cm. in the middle of the screen.
- Put the brightness potmeter (WM:R2) in the "click" position
- Adjust the light output on the monitor measured in the middle of the square to 300 +/- 5 cd/m², with the contrast potmeter (WM:R1). For Intgeris V/H/B System Families 250 cd/m² ± 5 cd/m².
- Fix the ring of the contrast potmeter (WM:R1) for "click" position. Check the click position by turning the potmeter a few times. The lightoutput should retuen to 300 resp. 250 cd/m².

CLICK-POSITION ADJUSTMENTS
for rotatable-version monitors only.

The start-off position is the previously adjusted brightness potmeter (cathode voltage = 90 Volt). The 'click' adjustments are to be done on an adjusted square of 4x4 cm on the screen, created with the shutters of the X-ray collimator

(A) Apply a video signal of 700mV excl.sync., by varying the dose. Measure at WM10:P1.
(B) Wait for about 2 minutes for light output stabilisation.
(C) Adjust the light output in the square to 450 cd/m² (± 15 cd/m²) with the contrast potmeter WM:R1.
(D) Adjust the light output in the square to 300 cd/m² (± 25 cd/m²) with the brightness potmeter (WM:R2).
(E) Apply a video signal of 180mV excl.sync..
(F) Wait for about 2 minutes for light output stabilisation.
(G) Check the light output in the square is 4 cd/m² (± 0.05 cd/m²). If the value is not correct, adjust with WM:R2 (brightness potmeter).
(H) Apply a video signal of 700mV excl.sync..
(I) Wait for about 2 minutes for light output stabilisation.
(J) Check the light output in the square is 300 cd/m² (± 25 cd/m²). If the value is not correct, adjust with WM:R1 (contrast potmeter).
(K) Repeat, if necessary the adjustments (E) through (J) until the light output is within the given specifications.
(L) Fix both potmeters in the adjusted positions for "click" setting.
(M) Check the proper click-settings by turning both potmeters a few times CW and CCW. Set them back in click and check light output values are according and (G) and (J) with corresponding signal settings.

(3) OVERSHOOT

Overshoot can be adjusted by displaying an image and eliminate the echo or shade.

- Put a strongly X-ray absorbing object e.g. a coin, on the image intensifier input surface plane with adhesive tape.
- Switch on fluoroscopy.
- Eliminate the echo or shade in the displayed image by turning the minimal overshoot capacitor C17 in the monitor.

(4) ABC CONTROL & ADJUSTMENT

Put the ABC to on with jumper W5. (see page F-9 or page F-10)
Apply a video signal of 700mV excl.sync..

Check the working of the LDR circuitry by observing the brightness of the screen :
- when covering the LDR with a finger the screen light output should decrease.
- when illuminating the LDR with e.g. a torch the screen light output should increase.

ABC sensitivity adjustment (only applicable to boards ≥ 4522 167 00274)

- Connect a Multimeter between W8-2 and ground.
- Apply a lightsource of 30 Lux* to the LDR.
- Adjust with R333 the voltage on the multimeter to 4.50 Volt.
- Check with covered LDR (not illuminated) the brightness on the CRT is 70 ± 10 cd/m².
  For Integris V/H/B System Families :
  30 ± 10 cd/m².
  Check with maximal illumination (≥ 1000 Lux) the brightness on the CRT is 300 ± 20 cd/m².
  For Integris V/H/B System Families :
  250 ± 20 cd/m².

* 30 Lux can be achieved through a circuitry as in figure 5 on page F-8.

(5) FINAL EVALUATION

- Put jumper W5 (temporarily) to off.
- Go back to the adjustment of image geometry to check the image width, height, linearity and the monitor circle position, for the contrast and brightness potmeters in the "click" positions.

2.1.6. Rotation control

> This adjustment is only applicable for rotatable versions of the monitor.

Connect WM60:X5, WM60:X6 and WM60:X9.
(X5 : mains supply)
(X6 : ± 15 Volt supply for operating buttons)
(X9 : low voltage supply for rotation logic)

If present: connect the remote control for rotation (WM60:X1 or WM60:X7).

When switching-on the monitor the deflection coil must automatically turn to its zero position.
Check left- and right turning of the deflection coil, both in local- and remote control.
Check (with a circle signal) whether the swinging of the circle during rotation remains within 1% of the image height.

Warning

Take care that the flat-cable from Basic board WM10 to the rotation control board WM60 is not running too close to the HT-transformer. This will cause line artifacts in the image.
Keep this cable as far as possible away from the transformer and fix it in such a position.

2.1.7. Delivery

- Metal strip for grounding must be parked between 1 and 2.
- Shove basic panel back.
- Put covers in potmeter holes.
- Fix all items and close the rear cover.

2.1.8. Final evaluation

Check the image critically for imperfections like:

(a) Extreme noise
(b) A tendency to oscillation
(c) Stripes

Also check for scratches or dirt on the monitor.

NOTE

The adjustment procedure as described in this section is valid for both 50 Hz and 60 Hz mains frequency applications, only:
- *for low line rate one should read 625 lines for 50 Hz or 525 lines for 60 Hz.*
- *for high line rate one should read 1249 lines for 50 Hz or 1049 lines for 60 Hz.*

2.2. DEFLECTION CENTERING

This adjustment is only needed in case of replacement of the deflection coil or the CRT.

NOTE

A second deflection coil is needed for this adjustment.

- Install the CRT and the deflection coil.
- Do not yet connect the deflection coil to WM10:X6.
- Attach a separate deflection coil on the connector WM10:X6 instead.
  (All other connectors and wires are left in place.)
- Turn brightness (WM:R2) and contrast (WM:R1) potmeters completely counter-clockwise.
- Switch on the monitor and **very carefully** turn up the brightness (WM:R2) until a little point of light becomes just visible. If necessary also turn the contrast (WM:R1) up a little.

Warning

If the brightness is turned up too high the CRT will become irreversibly damaged because of burning-in of the light point !!

- Adjust, with the magnet rings around the deflection coil on the CRT, the little point of light to the mechanical centre of the CRT.
- Turn brightness (WM:R2) and contrast potmeters completely counter clockwise again.
- Swich the monitor off.
- Disconnect the separate deflection coil from WM10:X6.
- Connect the deflection coil on the CRT to connector WM10:X6.
- Check the image geometry (see paragraph 2.1.3), the video amplification and brightness & contrast adjustment (see paragraph 2.1.5). If not correct, readjust the basic board.

Circuit diagram

To create a lightsource of 30 Lux, use the circuitry as shown below.
Take care that the current through the LED's is adjusted such that the emitted light is 30 Lux $\pm$ 10%.

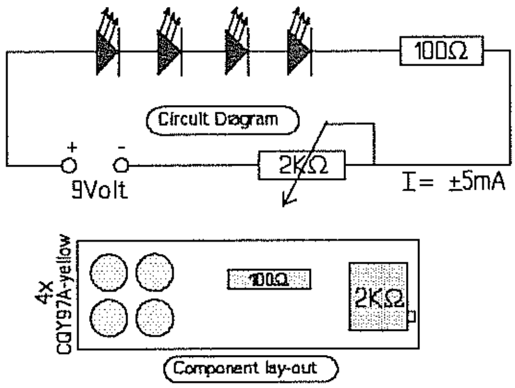


Figure 5

Measure with the lightmeter the light-output of the circuitry and adjust with the potmeter to 30 $\pm$ 10%. When measuring, take care that no other light-sources influence the measurement.
Mount the four LED's as close as possible together to get a lightsource with as much as posssible homogeneous light-output. Also the LED's will fit better into the window of the monitor bezel where the LDR is located. Fix the Lux-unit temporarely onto the bezel with a piece of adhesive tape.
Afterwards the adjustment on page F-6 for ABC can be easily made.
NOTE:
If more monitors are used in the same room, it is more important to have all monitors adjusted equally than having them exactly adjusted to 30 Lux.

2.3. OVERVIEW OF ADJUSTMENT FACILITIES ON BASIC BOARD WM10

For board 4522 167 00273

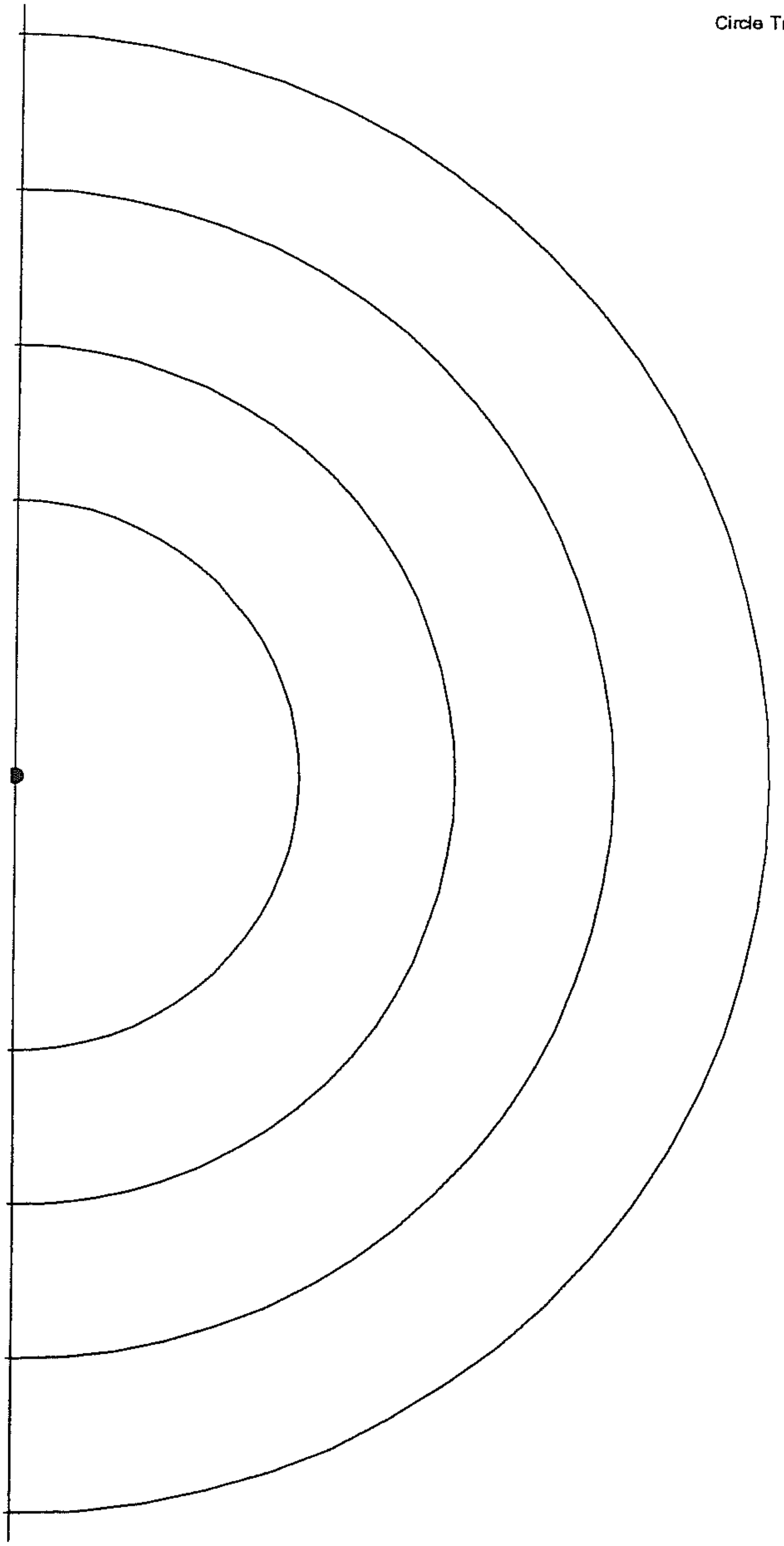
Name	Position	Function
WM10: S1	1-2	Terminates WM10:X1 with 75 ohm. With WM10:W4 on 1-2, WM10:X2 is suitable for parking a second video cable. With WM10:W4 on 1-3, WM10:X2 is suitable for a separate sync. input (if applicable).
	1-3	Loop through (WM10:X1 = WM10:X2), WM10:X1 not terminated.
WM10: W1A		Double frame frequency
W1B		Normal frame frequency
W2A		Double frame frequency
W2B		Normal frame frequency
W3A		3:4 scan ratio High Line rate
W3B		1:1 scan ratio High Line rate
W4	1-2	Sync. from VIBS at WM10:X1
	1-3	Separate sync. input at WM10:X2 (terminate externally !)
W5	1-2	LDR switched off
	1-3	LDR switched on
W6	1-2	1:1 scan ratio High Line rate
	1-3	3:4 scan ratio High Line rate
W7	1-2	Ambient Light Dependent Contrast Control : Standard
	1-3	Ambient Light Dependent Contrast Control : Low
W8	1-2	Ambient Light Dependent Brightness Control : On
	1-3	Ambient Light Dependent Brightness Control : Off
W9	1-2	Automatic High / Low Line selection or fixed High Line
	1-3	Fixed Low Line (in combination with WM10:W10)
W10A		Fixed High Line
W10B		Automatic High / Low Line selection or fixed Low Line (in combination with WM10:W9)
WM: R1		Contrast adj. (front panel)
R2		Brightness adj. (front panel)
WM10: R3		Maximum H.T. adj. (21 kV)
R4		Vertical linearity
R5		Vertical shift
R6		Low Line height adj.
R7		High Line H.T. & image width adj. for 1:1 scan ratio
R8		Low Line H.T. & image width adj.
R9		Horizontal shift
R10		Line (Hor.) time adj. (64.0 or 63.5 µsec)
R13		Centre focus
R14		G1 adjust
R15		Cathode adjust (white limiting)
R53		High Line height adj.
R201		High Line H.T. & image width adj. for 3:4 scan ratio
WM10: C17		Frequency correction (minimal overshoot video)
L4		Low Line horizontal linearity
L5		High Line horizontal linearity
L6		Low Line image width
WM20: R1		+120 volt adj.
WM30:		No adjustments
WM60:		No adjustments

2.4. OVERVIEW OF ADJUSTMENT FACILITIES ON BASIC BOARD WM10

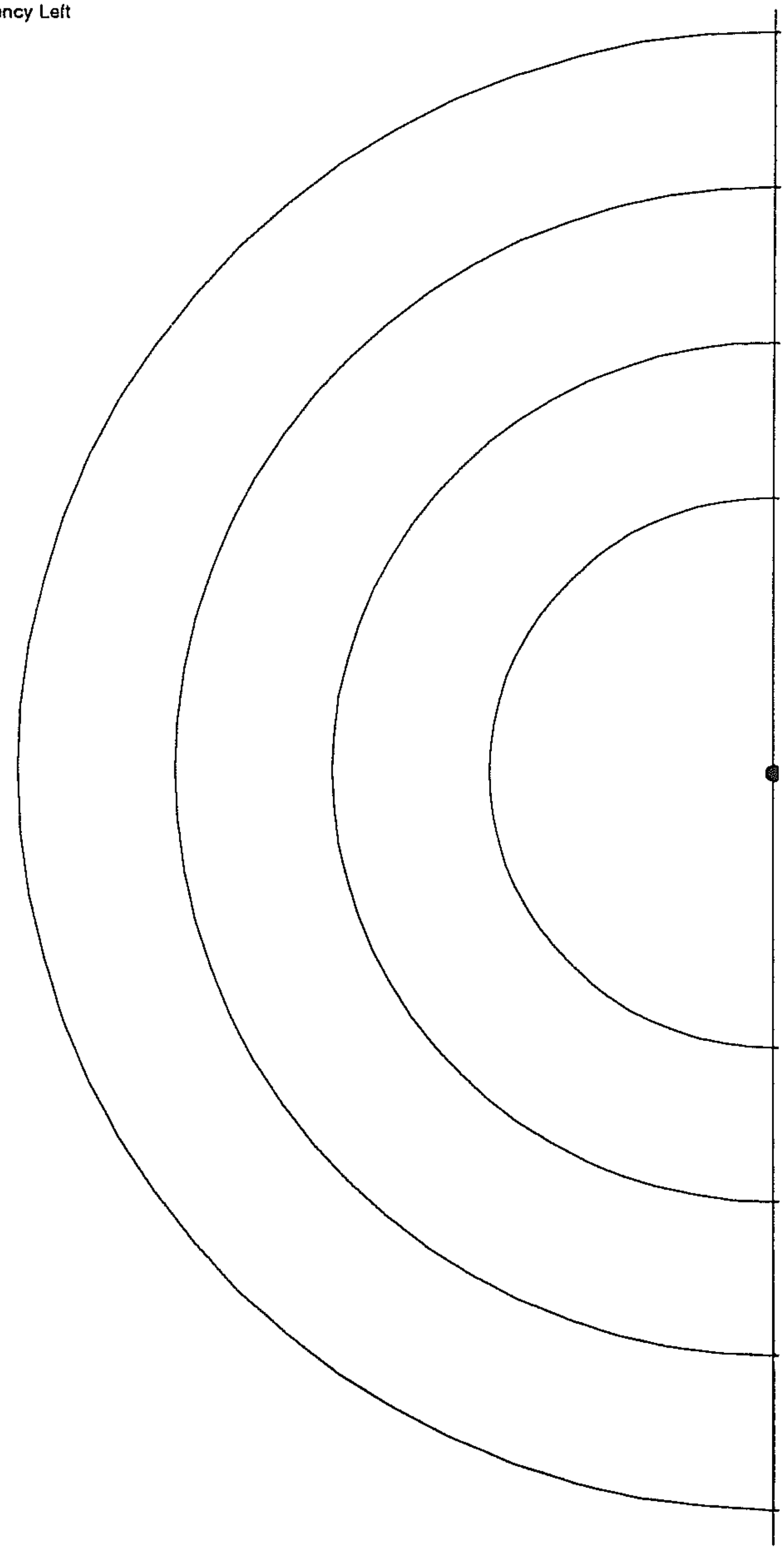
For boards ≥ 4522 167 00274

Name	Position	Function
WM10: S1	1-2	Terminates WM10:X1 with 75 ohm. With WM10:W4 on 1-2, WM10:X2 is suitable for parking a second video cable. With WM10:W4 on 1-3, WM10:X2 is suitable for a separate sync. input (if applicable).
	1-3	Loop through (WM10:X1 = WM10:X2), WM10:X1 not terminated.
WM10: W1A		Double frame frequency
W1B		Normal frame frequency
W2A		Double frame frequency
W2B		Normal frame frequency
W3A		3:4 scan ratio High Line rate
W3B		1:1 scan ratio High Line rate
W4	1-2	Sync. from VIBS at WM10:X1
	1-3	Separate sync. input at WM10:X2 (terminate externally !)
W5	1-2	LDR switched on
	1-3	LDR switched off
W6	1-2	1:1 scan ratio High Line rate
	1-3	3:4 scan ratio High Line rate
W7	1-2	Ambient Light Dependent Contrast Control : Standard
	1-3	Ambient Light Dependent Contrast Control : Low
W8	1-2	Ambient Light Dependent Brightness Control : On
	1-3	Ambient Light Dependent Brightness Control : Off
W9	1-2	Automatic High / Low Line selection or fixed High Line
	1-3	Fixed Low Line (in combination with WM10:W10)
W10A		Fixed High Line
W10B		Automatic High / Low Line selection or fixed Low Line (in combination with WM10:W9)
W11	1-2	Normal mode (1100mV)
	1-3	DCAS mode (700mV)
W29	1-2	Normal mode
	1-3	VCR mode
WM: R1		Contrast adj. (front panel)
R2		Brightness adj. (front panel)
WM10: R2		Horizontal shift HLR
R3		Maximum H.T. adj. (21 kV)
R4		Vertical linearity
R5		Vertical shift
R6		Low Line height adj.
R7		High Line H.T. & image width adj. for 1:1 scan ratio
R8		Low Line H.T. & image width adj.
R9		Horizontal shift
R10		Line (Hor.) time adj. (64.0 or 63.5 μsec)
R13		Centre focus
R14		G1 adjust
R15		Cathode adjust (white limiting)
R53		High Line height adj.
R201		High Line H.T. & image width adj. for 3:4 scan ratio
R333		ABC adjustment
WM10: C17		Frequency correction (minimal overshoot video)
L4		Low Line horizontal linearity
L5		High Line horizontal linearity
L6		Low Line image width
WM20: R1		+120 volt adj.
WM30:		No adjustments
WM60:		No adjustments

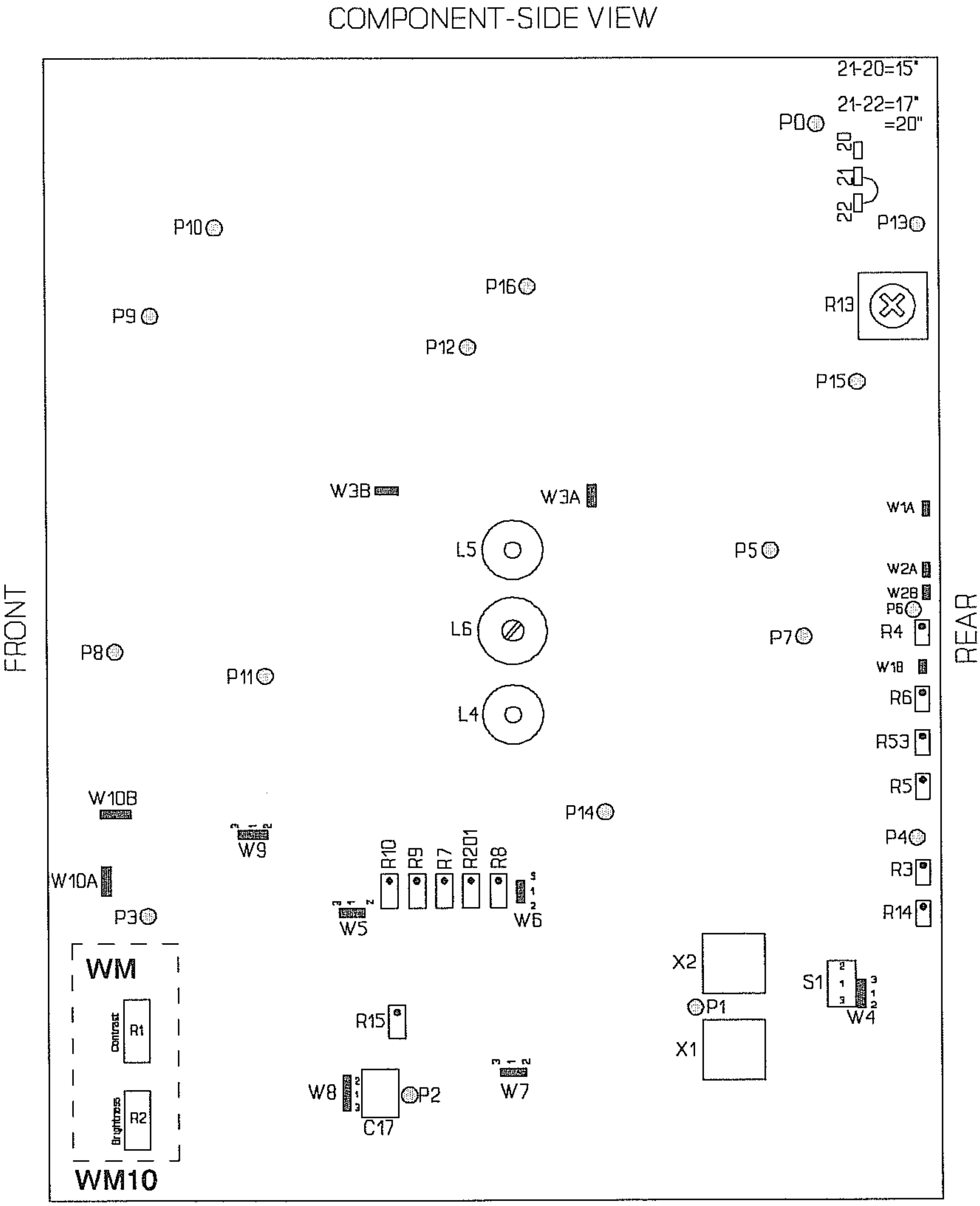
Circle Transparency Right



Circle Transparency Left

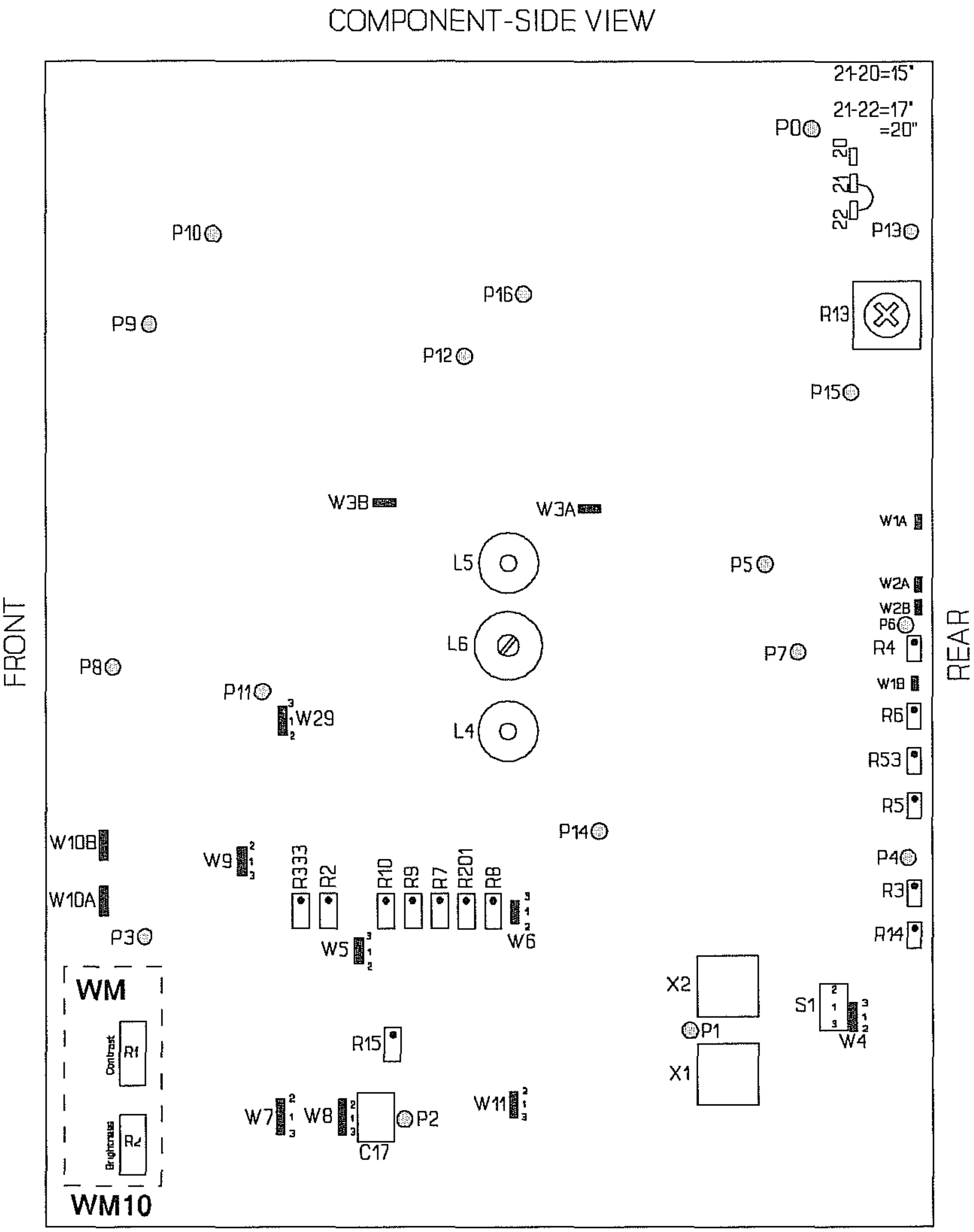


Component-side view of basic board WM10



4522 167 00273

Component-side view of basic board WM10



4522 167 00274

Philips Medical Systems

parts list

Philips Medical Systems Nederland B.V. | Technical Service | Best

SERVICE PARTSLIST UNIT

PEI: 9807 753 00001

DESCRIPTION: HMR17S TV MONITOR.ROTATABLE 50Hz.

SERIAL NR:

List of pages and drawings

*printing instructions 4522 983 32091

SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
005	WM 10	4522 300 05001	SERV.POTM.ASSY PCB	
010	WM 20	4522 107 87853	POWER SUPPLY 20"MON.HR PCB	
015	WM 30	4522 107 87805	TUBE SOCKET 20"MON.HR PCB	
020	WM 40	4522 108 01301	CONTACT PANEL 20" MON.	
025	WM 60	4522 108 10002	ROTATION CONTROL 20"MON.	
030	F1/F4	2422 086 01042	UL-FUSE T MDL	1A,250V.
035	M1	4522 104 10302	MOTOR RSM50/8FDG	220V.
040	S1 (SWITCH ASSY)	4522 106 00701	CONNECTING CORD SWITCH	
045	T1	3112 328 32322	MAINS TRANSFORMER	
050	T2	3322 603 00303	DEFLECTION COIL AT1039/095	
055		9301 524 50005	TV TUBE 17" M41EAA27WW	
060	WM 50-S1	2422 120 00141	MICROSWITCH VCSP-UL 3N3	
065	WM 50-S1r	2422 135 00013	ROLLER for MICROSWITCH	
070	X1	2422 015 13127	PLUG LCBS-3R	5.4MM
075	Z1	2432 527 00018	MAINS FILTER FN322-1/05	
080		4522 161 78001	MASKER 17"	
085		4522 161 78081	CAP 17"	

SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
090		4522 161 78101	BACK PLATE 17"	
095		4522 161 78021	CHASSIS 17"	
100		4522 161 64541	TOOTHWHEEL	
105		4522 161 64561	TOOTHWHEEL PLATE	
110		4522 161 78181	KNOB	
115		4522 161 78221	FOOT	
120		4522 103 87461	CAP	
125		4522 106 00611	CONNECTING CORD WM11-WM13	
130		4522 106 00621	CONNECTING CORD WM10-WM12	
135		4522 106 00642	CONNECTING CORD LDR-LED	
140		4522 106 00671	FLAT-CABLE WM10X9-WM60X9	
145		4522 106 00691	CONNECTING CORD DIN	
150		4522 106 00711	CONNECTING CORD WM60X3	

PHILIPS

Philips Medical Systems

parts list

Philips Medical Systems Nederland B.V. | Technical Service | Best

SERVICE PARTSLIST UNIT

PEI: 9807 753 10001

DESCRIPTION: HMR17S TV MONITOR ROTATABLE 60Hz.

SERIAL NR:

List of pages and drawings

*printing instructions 4522 983 32101

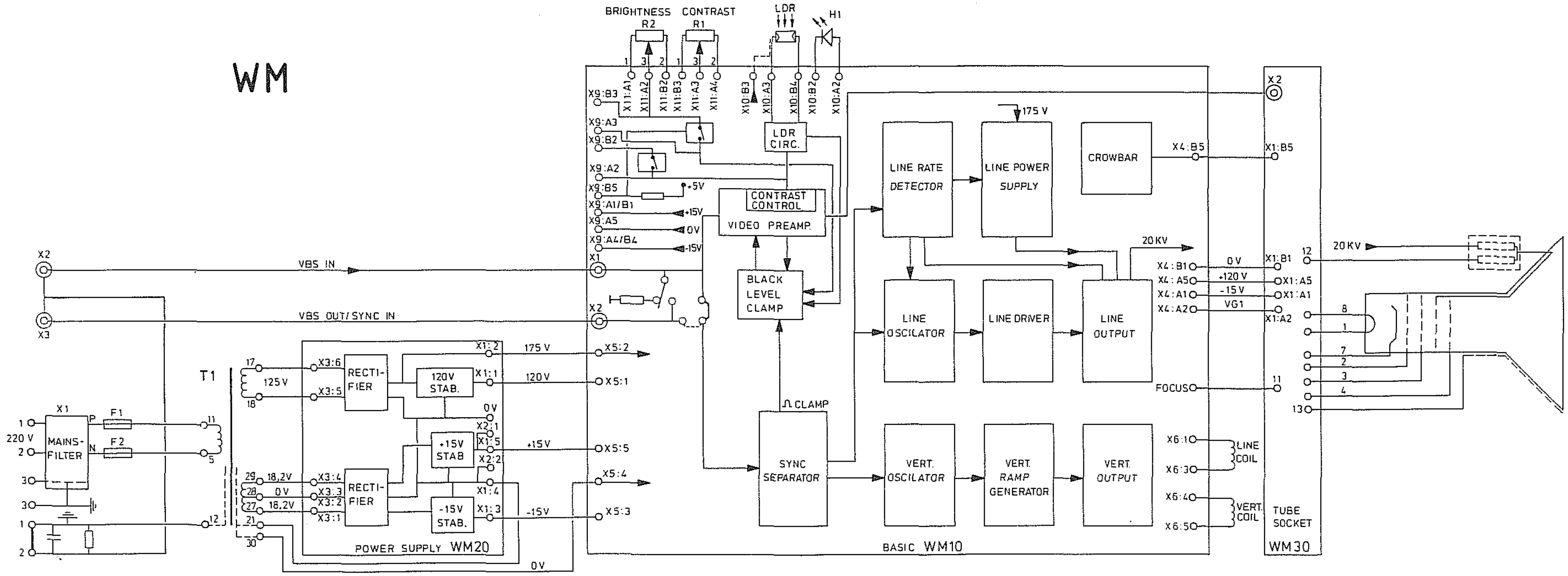
SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
005	WM 10	4522 300 05001	SERV.POTM.ASSY PCB	
010	WM 20	4522 107 87853	POWER SUPPLY 20"MON.HR PCB	
015	WM 30	4522 107 87805	TUBE SOCKET 20"MON.HR PCB	
020	WM 40	4522 108 01301	CONTACT PANEL 20" MON.	
025	WM 60	4522 108 10002	ROTATION CONTROL 20"MON.	
030	F1/F4	2422 086 01042	UL-FUSE T MDL	1A.250V.
035	M1	4522 104 10302	MOTOR RSM50/8FDG	220V.
040	S1 (SWITCH ASSY)	4522 106 00701	CONNECTING CORD SWITCH	
045	T1	3112 328 32322	MAINS TRANSFORMER	
050	T2	3322 603 00303	DEFLECTION COIL AT1039/09S	
055		9301 524 50005	TV TUBE 17" M41EAA27WW	
060	WM 50-S1	2422 120 00141	MICROSWITCH VCSP-UL 3N3	
065	WM 50-S1r	2422 135 00013	ROLLER for MICROSWITCH	
070	X1	2422 015 13127	PLUG LCBS-3R	5.4MM
075	Z1	2432 527 00018	MAINS FILTER FN322-1/05	
080		4522 161 78001	MASKER 17"	
085		4522 161 78081	CAP 17"	

SCHEME/ PAGE	INDEX	CODENUMBER	DESCRIPTION	DATA
090		4522 161 78101	BACK PLATE 17"	
095		4522 161 78021	CHASSIS 17"	
100		4522 161 64541	TOOTHWHEEL	
105		4522 161 64561	TOOTHWHEEL PLATE	
110		4522 161 78181	KNOB	
115		4522 161 78221	FOOT	
120		4522 103 87461	CAP	
125		4522 106 00611	CONNECTING CORD WM11-WM13	
130		4522 106 00621	CONNECTING CORD WM10-WM12	
135		4522 106 00642	CONNECTING CORD LDR-LED	
140		4522 106 00671	FLAT-CABLE WM10X9-WM60X9	
145		4522 106 00691	CONNECTING CORD DIN	
150		4522 106 00711	CONNECTING CORD WM60X3	

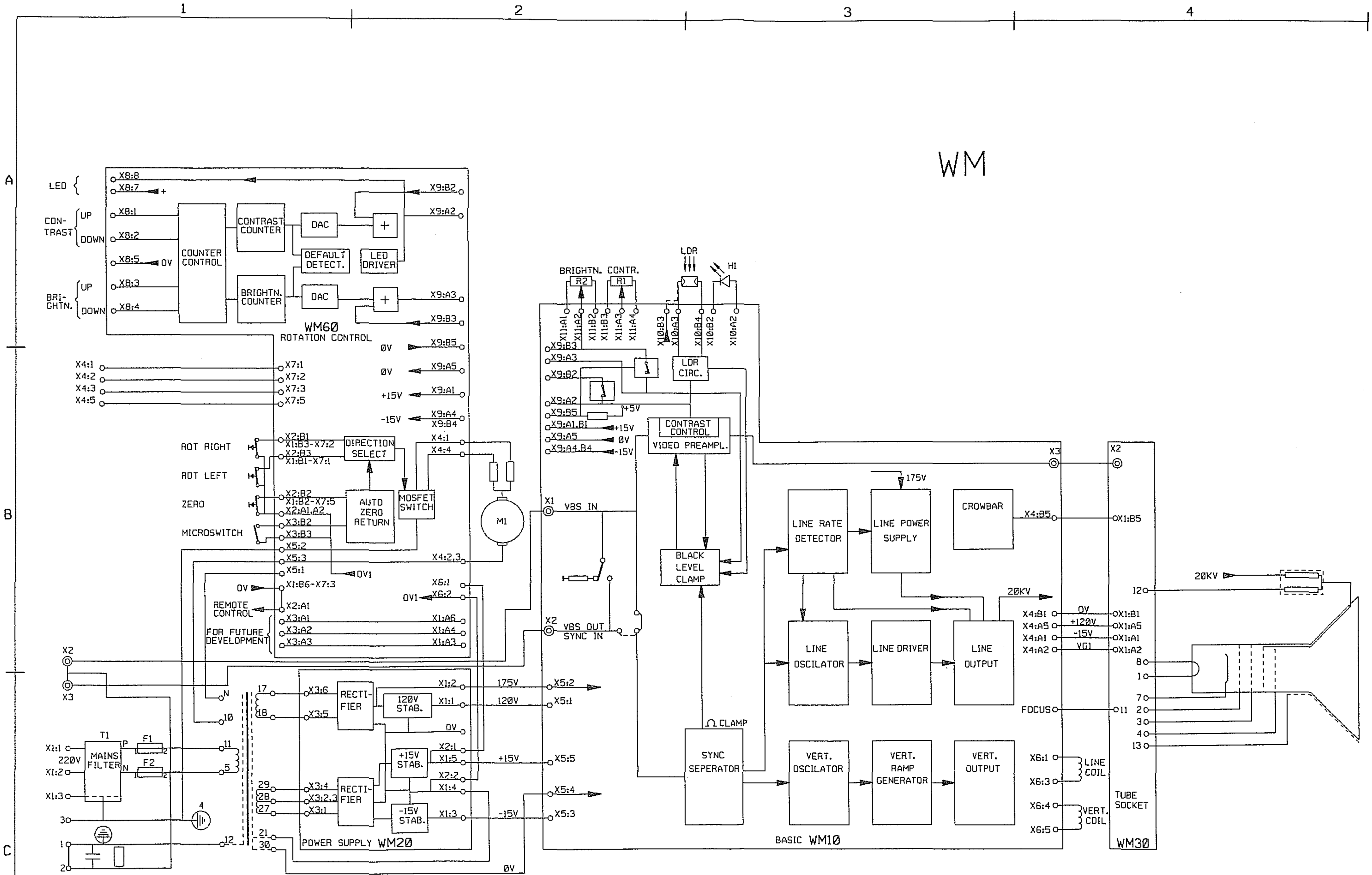
Section Z: DRAWINGS

Contents

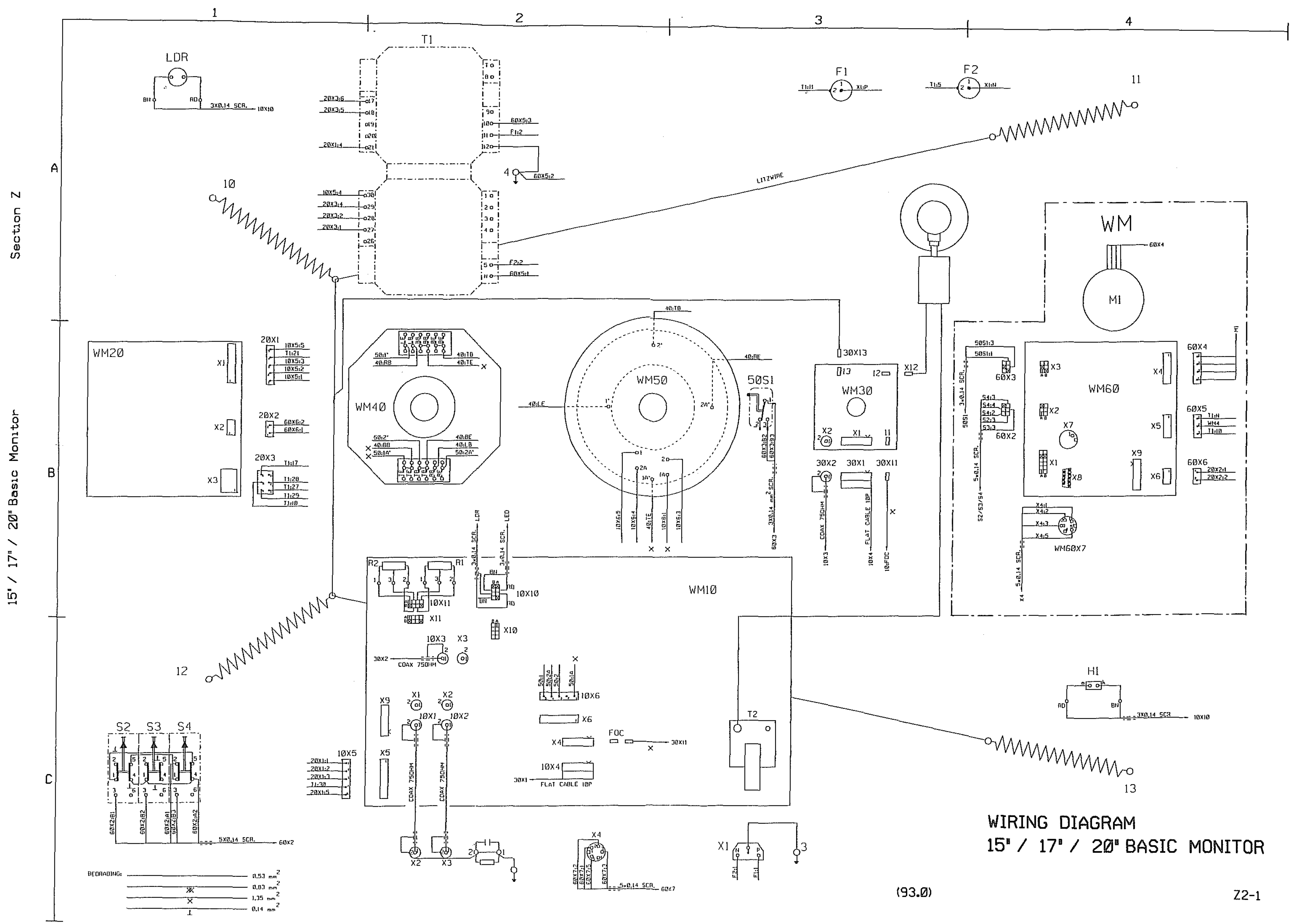
WM



BLOCK DIAGRAM
15" / 17" / 2Ø" BASIC MONITOR



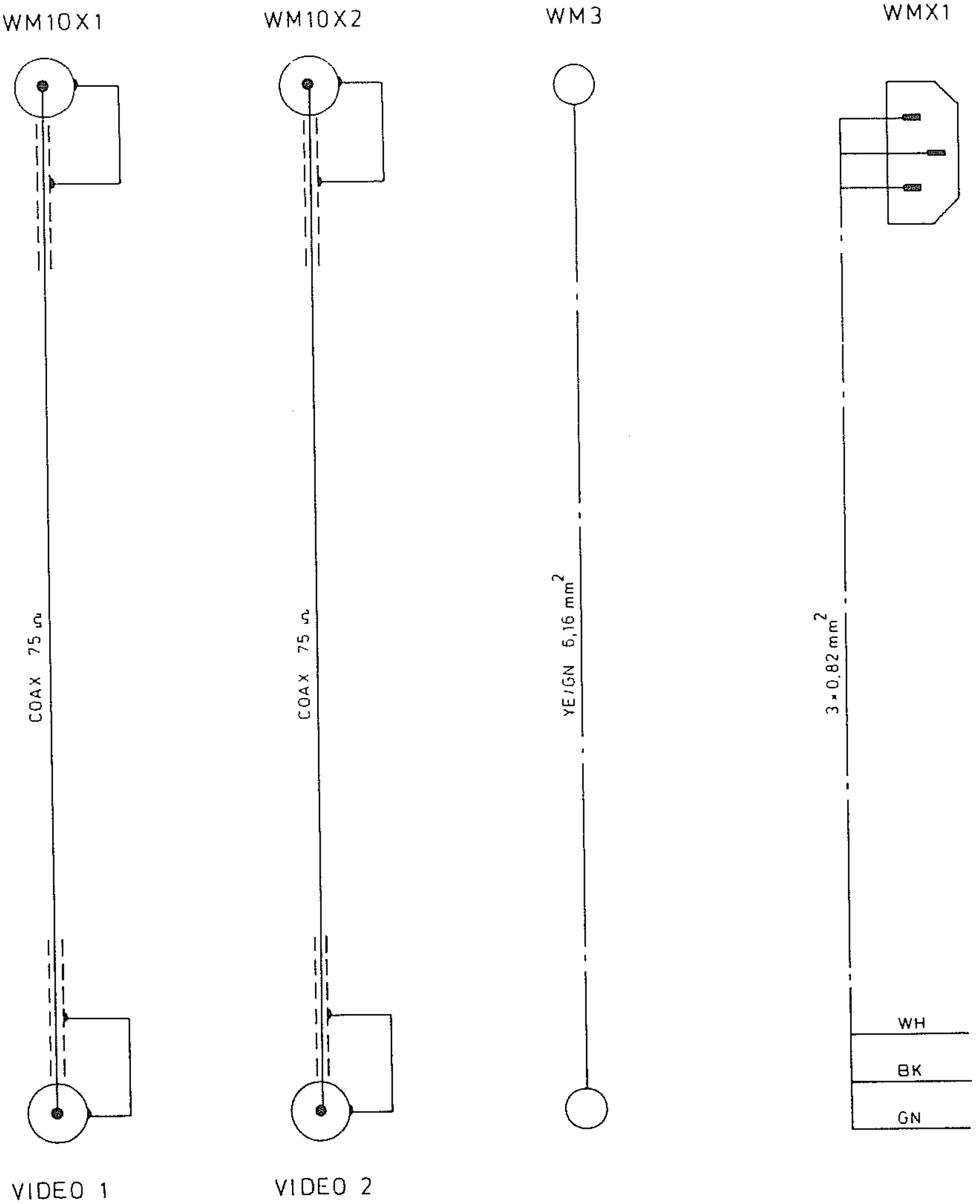
BLOCK DIAGRAM
15" / 17" / 20" BASIC MONITOR ROT.



WIRING DIAGRAM
15" / 17" / 2Ø" BASIC MONITOR

(93.Ø)

Z2-1



CABLE HARNESS
15" / 17" / 20" BASIC MONITOR

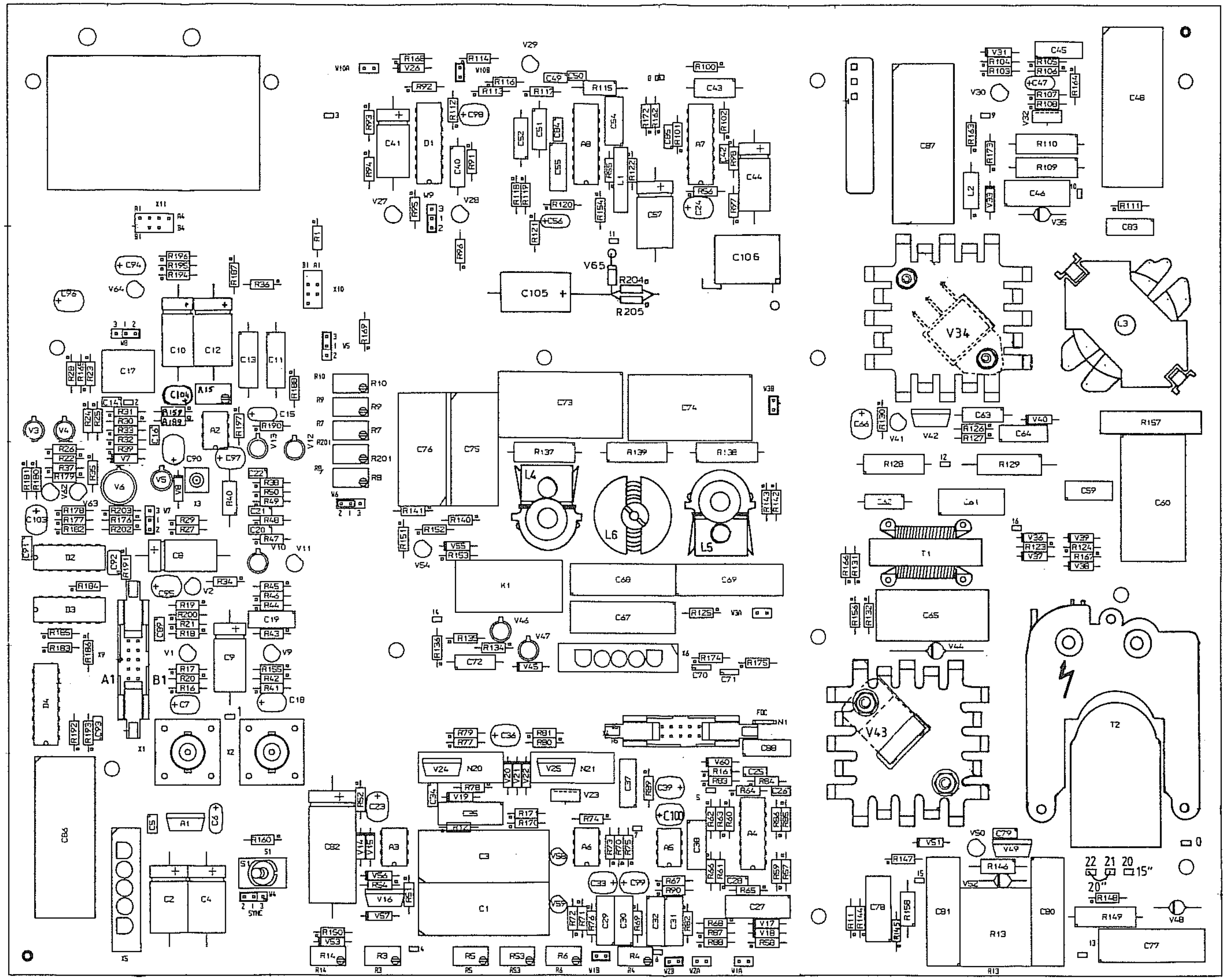
REFERENCE LIST Z3-1.x pages for board 4522 167 00273

Mnemonic	Page(coord.)
+7V	1.5(a3)
-36V	1.4(a2)
+120V	1.2(c1),1.4(a4),1.4(b1)
+175V	1.2(b4,c4,c1),1.3(a3)
625/1249	1.4(c1)
A	1.2(a2),1.6(b1)
AX	1.4(c3),1.5(c4)
B	1.2(a2),1.6(a3)
C17	1.2(b3)
COMPBLANKING	1.2(a3),1.4(a3)
COMPSYNC	1.2(c2),1.3(c1),1.5(b1)
CROWBAR	1.2(c3)
H-DRIVE	1.3(b4),1.4(c1)
H-SHIFT	1.3(b4),1.4(b1)
HOLDDOWN	1.3(a4),1.4(a1)
HV SUPPLY	1.3(a4),1.4(a1)
K1	1.4(c2,b2,b3)
L4	1.4(b3)
L5	1.4(b3)
L6	1.4(b3)
FBPOWER	1.4(a1),1.5(a3)
FOCUS	1.4(b4)
MP1	1.2(a1)
MP2	1.2(a3)
MP3	1.2(c2)
MP4	1.2(c4)
MP5	1.5(b2)
MP6	1.5(b3)
MP7	1.5(b4)
MP8	1.3(b3)
MP9	1.3(b4)
MP10	1.3(a4)
MP11	1.3(b2)
MP12	1.4(c1)
MP13	1.4(b2)
MP14	1.4(b3)
MP15	1.4(b4)
MP16	1.4(a1)
MP20	1.4(b2)
MP21	1.4(b2)
MP22	1.4(b2)
R3	1.2(c3)
R4	1.5(b3)
R5	1.5(a4)
R6	1.5(b3)
R7	1.3(b2)
R8	1.3(b2)
R9	1.3(c2)
R10	1.3(c3)
R13	1.4(b4)
R14	1.4(a4)
R15	1.2(a2)
R53	1.5(c3)
R201	1.3(b2)

Mnemonic	Page(coord.)	Connector
S1	1.2(a1)	
SYNC	1.2(b1)	X2
TO TUBE 20kV	1.4(a2)	
V-BLANK	1.4(b2),1.5(b2)	
VBRIGHT	1.2(b3),1.6(b2)	
VDYNFOC	1.4(c3),1.5(c3)	
VG1	1.4(a4)	
VIDEOIN	1.2(a1)	X1
VIDEOOUT	1.2(a4)	X3
W1A	1.5(a2)	
W1B	1.5(b3)	
W2A	1.5(c2)	
W2B	1.5(b3)	
W3A	1.4(c2)	
W3B	1.4(b3)	
W4	1.2(a1)	
W5	1.6(c1)	
W6	1.3(b2)	
W7	1.6(a1)	
W8	1.6(c2)	
W9	1.3(c1)	
W10A	1.3(b1)	
W10B	1.3(b1)	
	1.4(a4)	X4
	1.2(c1)	X5
	1.4(b2),1.5(b4)	X6
	1.6(a3)	X9
	1.6(b1)	X10
	1.6(c3)	X11

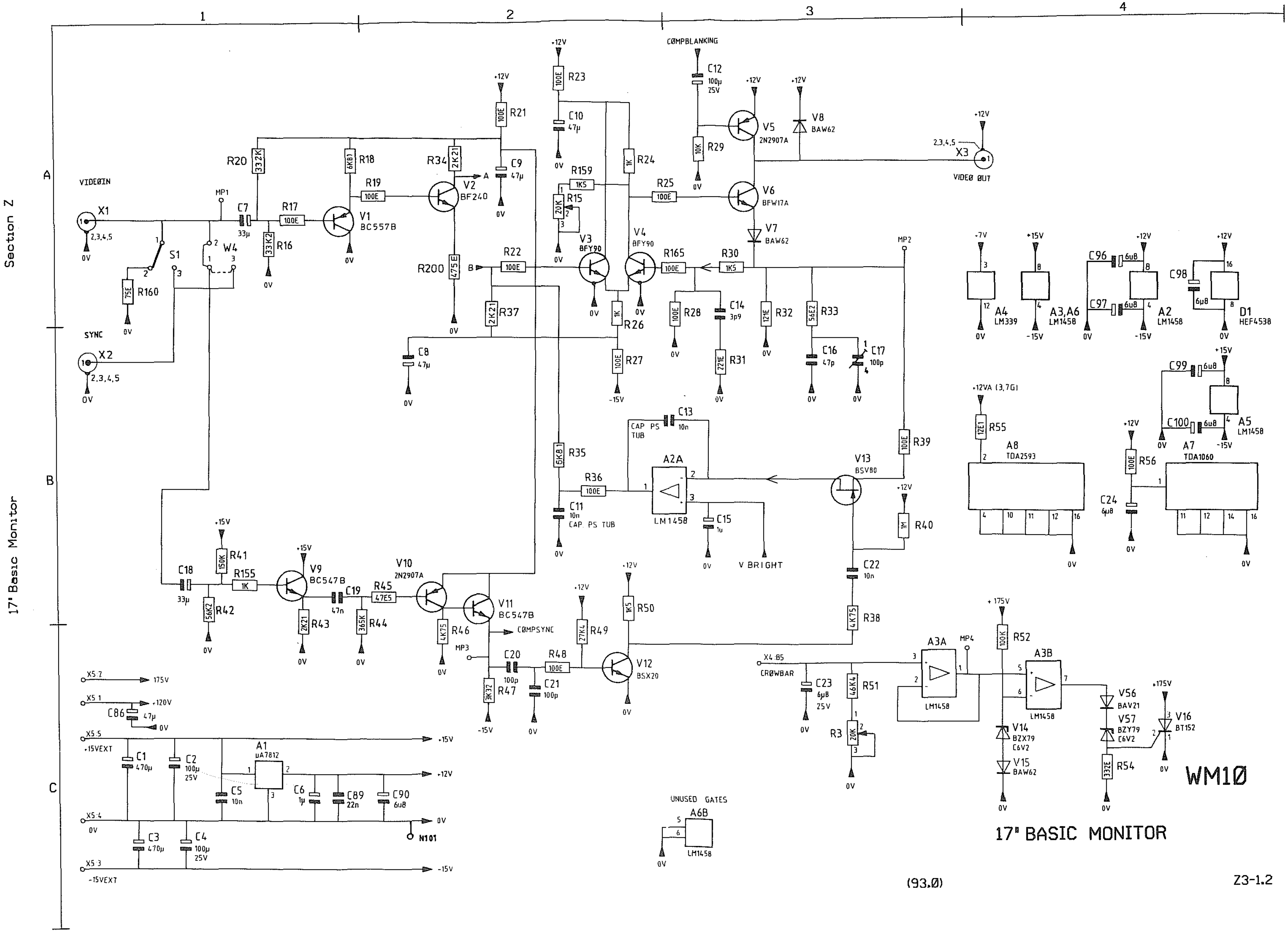
1 2 3 4

A B C

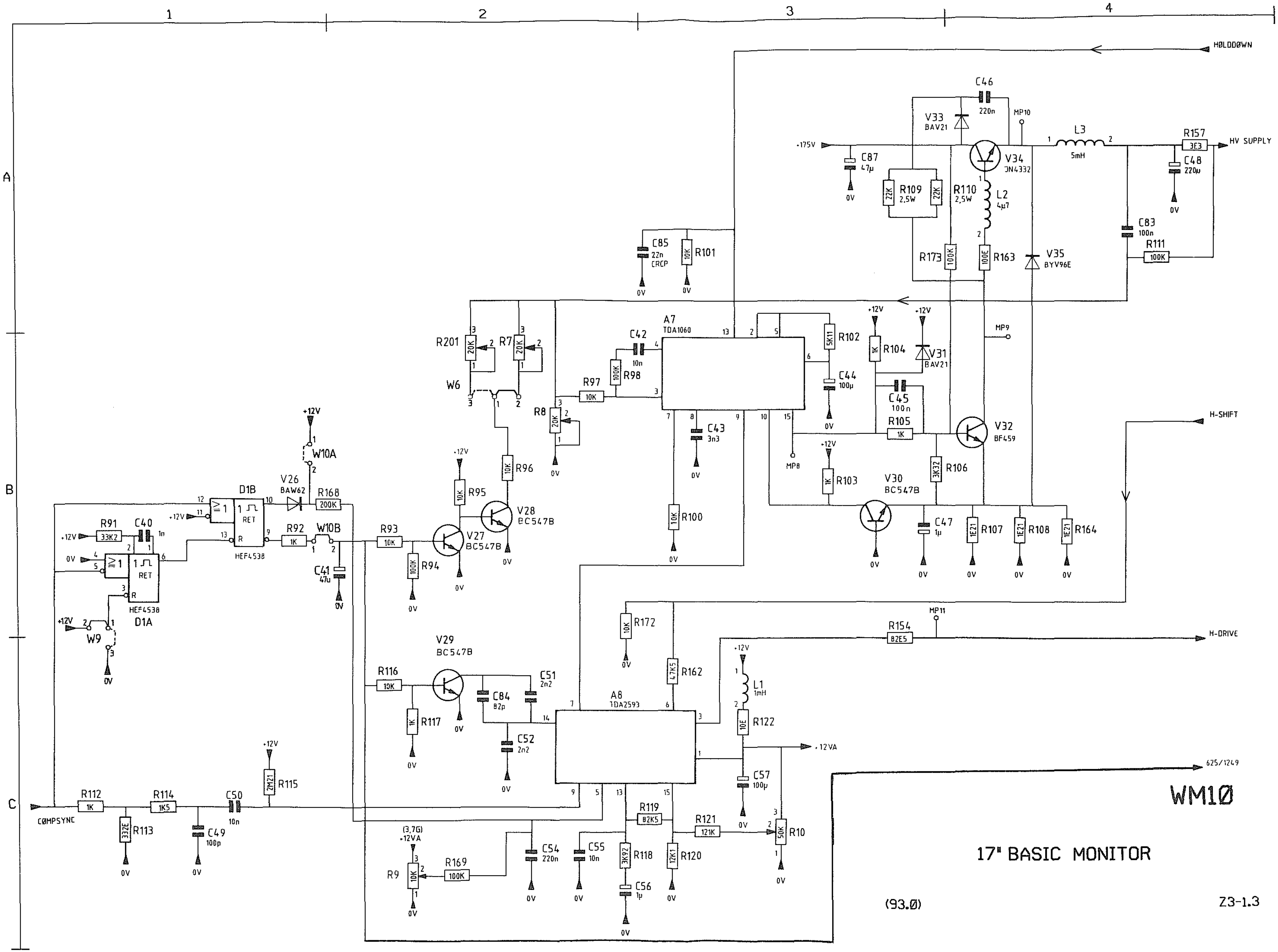


WM10

17" BASIC MONITOR



Section Z
17" Basic Monitor
VIDEØIN
X1
SYNC
X2
S1
W4
R160
C7
R17
R16
R20
R18
V1
BC557B
R19
R34
V2
BF240
R21
C9
R200
R22
R37
C8
R23
C10
R159
R15
V3
BFY90
V4
BFY90
R24
R25
R26
R27
R35
C11
CAP. PS TUB
R36
C13
A2A
LM1458
C15
V BRIGHT
CØMPBLANKING
C12
V5
2N2907A
V8
BAW62
R29
V6
BFW17A
V7
BAW62
R165
R30
R28
C14
R31
R32
R33
C16
C17
MP2
R39
V13
BSV80
R40
C22
R38
X3
VIDEØ ØUT
A4
LM339
A3,A6
LM1458
C96
C97
A2
LM1458
C98
D1
HEF4538
C99
C100
A5
LM1458
R55
A8
TDA2593
R56
A7
TDA1060
C24
C18
R41
R155
R42
V9
BC547B
C19
R43
R44
R45
V10
2N2907A
V11
BC547B
R46
CØMPSYNC
MP3
C20
R48
C21
R47
R49
R50
V12
BSX20
X4:B5
CRØWBAR
C23
R51
R3
A3A
LM1458
MP4
R52
A3B
LM1458
V14
BZX79
C6V2
V15
BAW62
V56
BAV21
V57
BZY79
C6V2
R54
V16
BT152
X5:2
X5:1
C86
X5:5
+15VEXT
C1
C2
A1
μA7812
C5
C6
C89
C90
X5:4
C3
C4
N101
X5:3
-15VEXT
UNUSED GATES
A6B
LM1458
WM10
17" BASIC MONITOR
(93.Ø)
Z3-1.2



Section Z

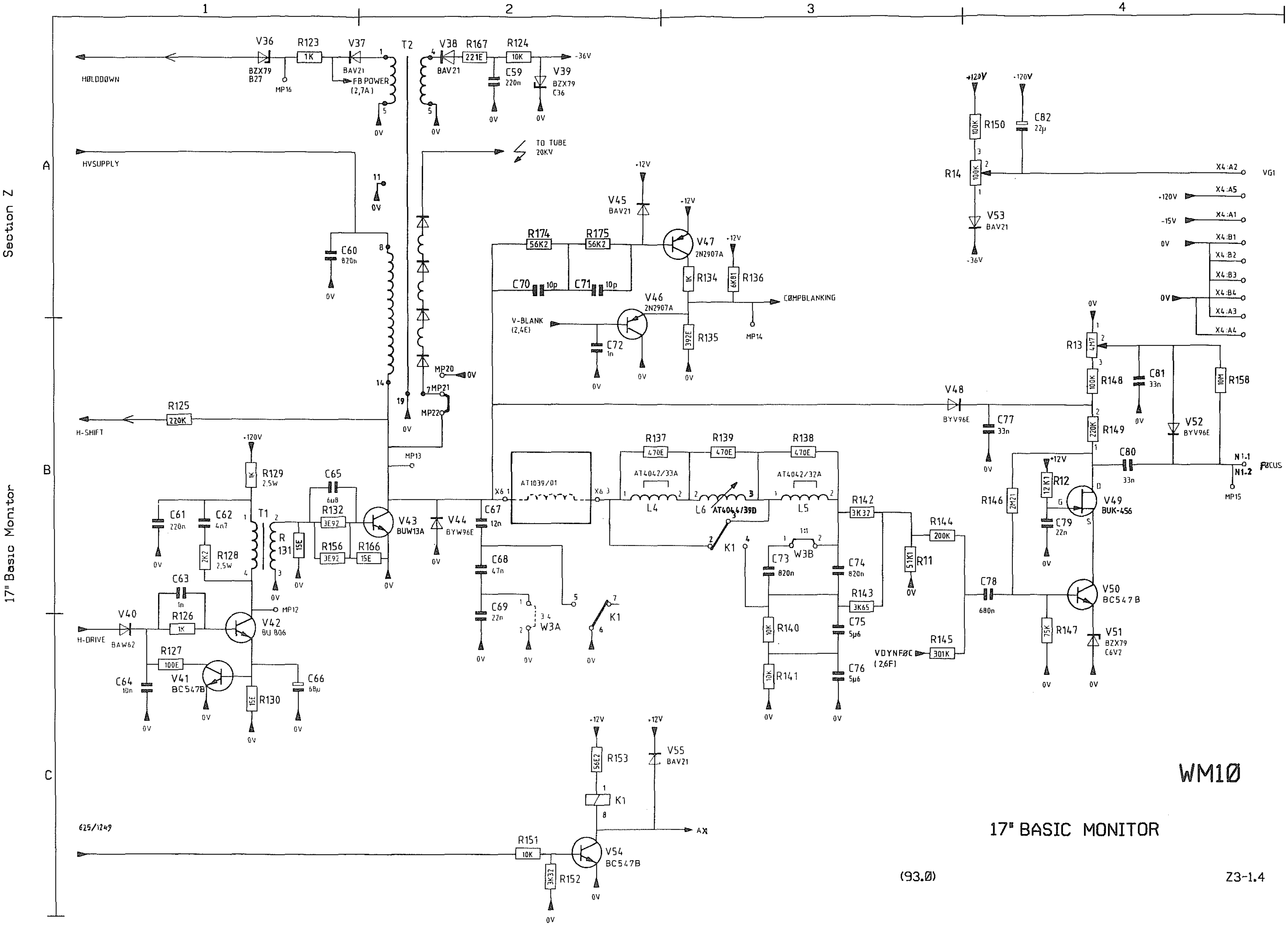
17" Basic Monitor

WM10

17" BASIC MONITOR

(93.0)

Z3-1.3



WM1Ø

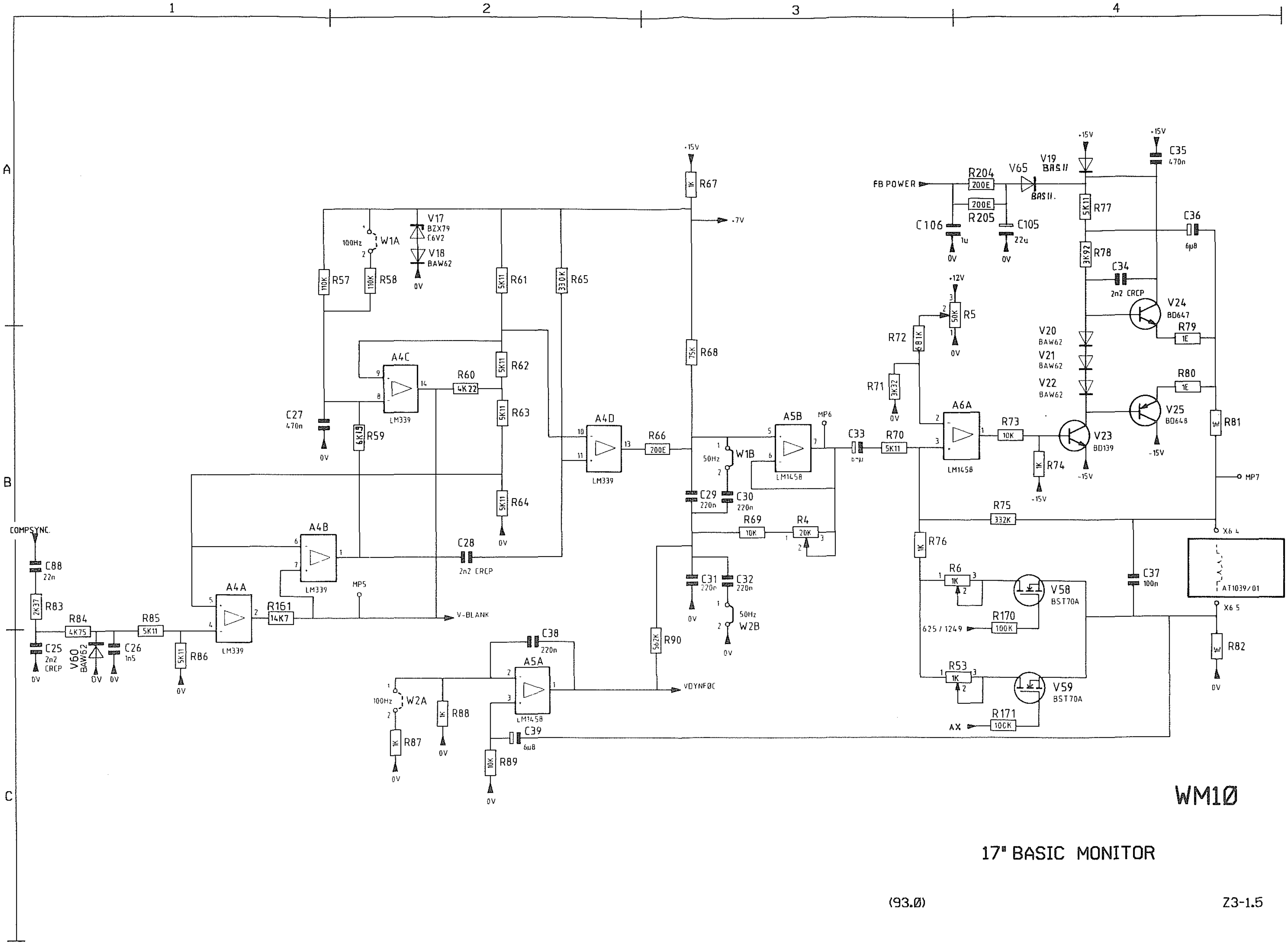
17" BASIC MONITOR

(93.Ø)

Z3-1.4

Section Z

17" Basic Monitor



WM10

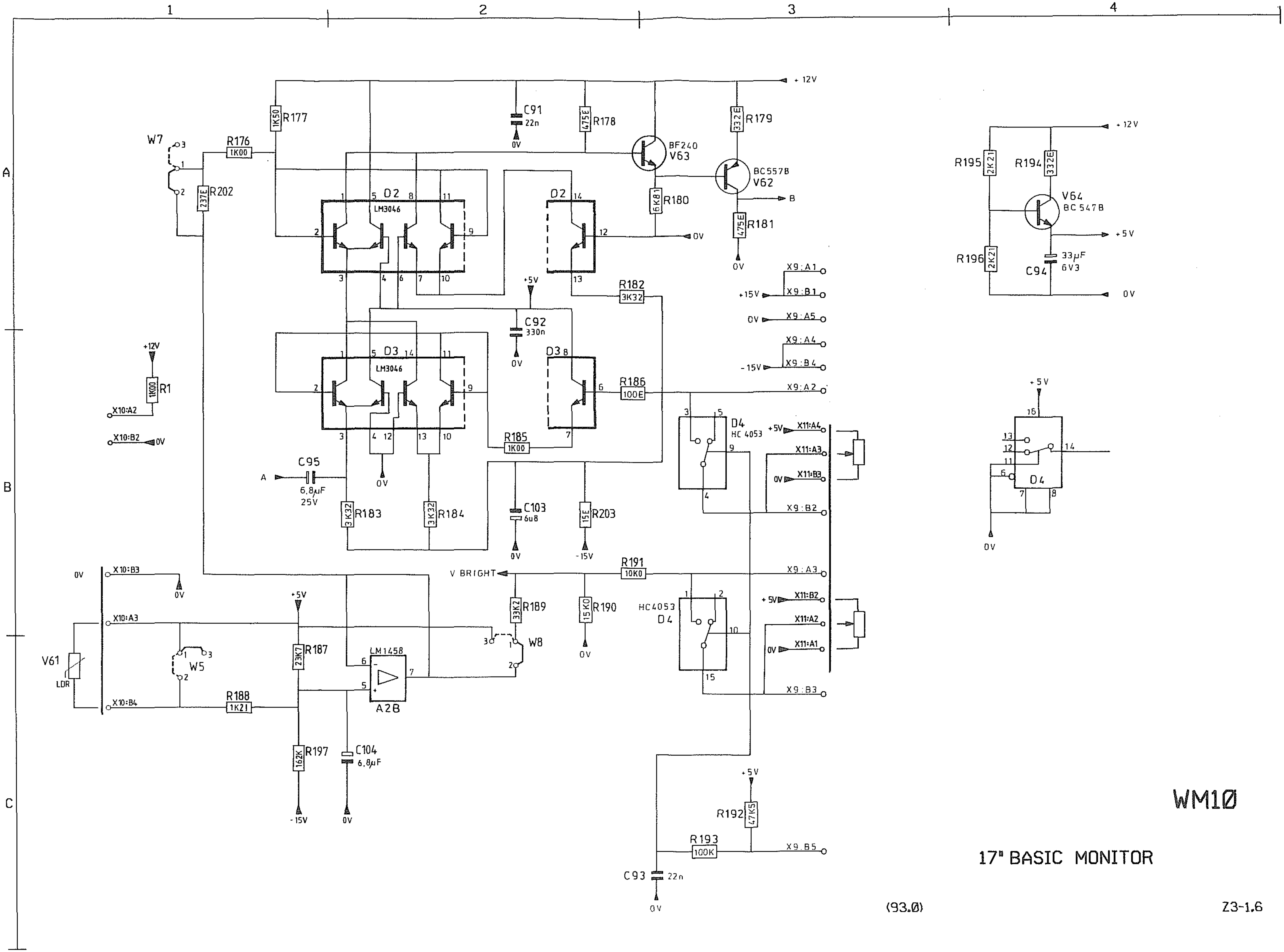
17" BASIC MONITOR

(93.0)

Z3-1.5

Section Z

17" Basic Monitor



WM1Ø

17" BASIC MONITOR

(93.Ø)

Z3-1.6

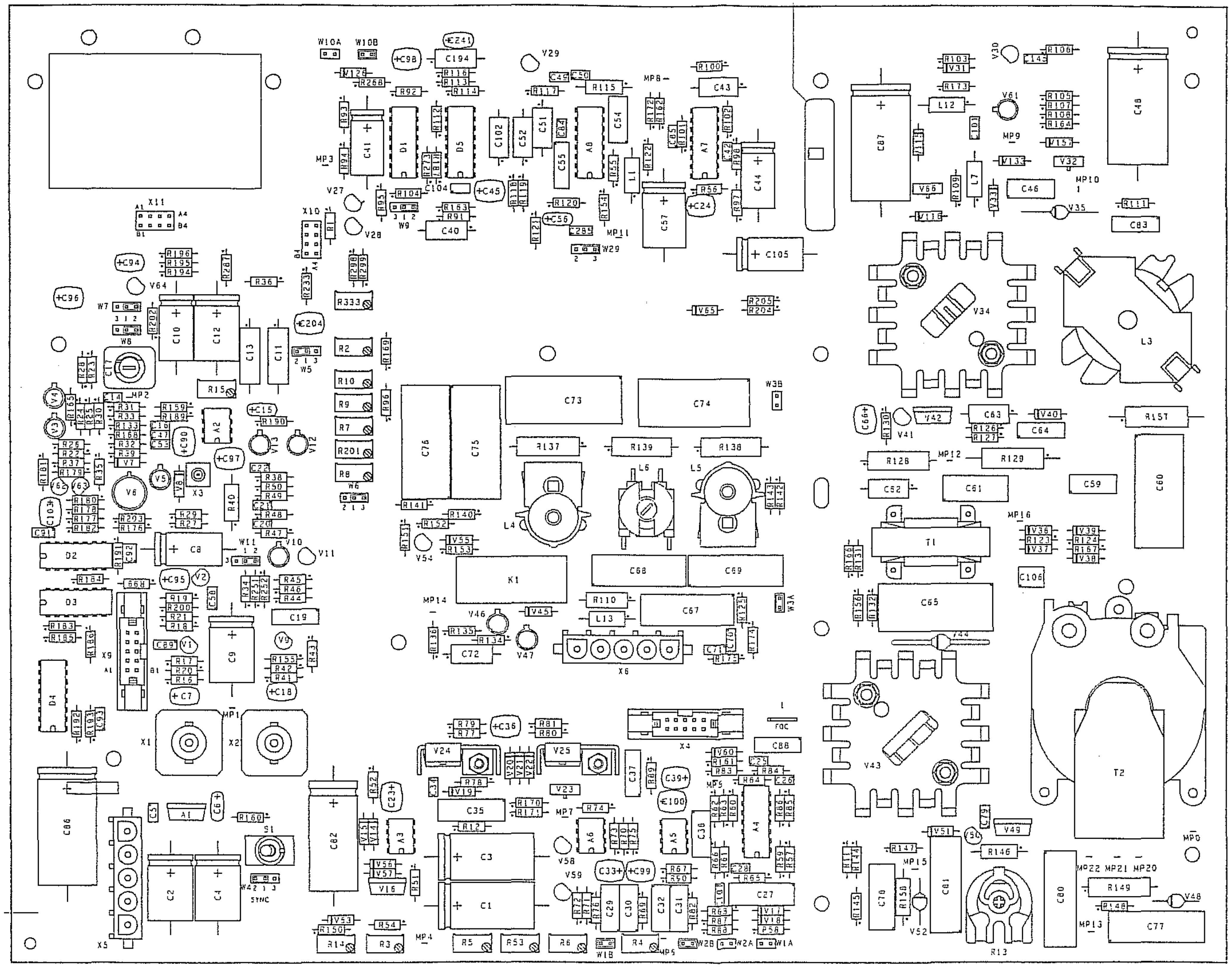
REFERENCE LIST Z3-1.x pages for board 4522 167 00274

Mnemonic	Page(coord.)
+7V	1.5(a1),1.5(a2),1.5(b2)
-36V	1.4(a2),1.4(a4)
+120V	1.4(a3),1.4(b1),1.7(c2)
+175v	1.3(b3),1.7(b3)
625/1249	1.3(a4),1.3(b4),1.3(b2),1.4(c2),1.5(c3)
A	1.2(a2),1.6(b3)
B	1.2(a2),1.6(a4)
C	1.4(c2),1.5(c3)
C17	1.2(b4)
COMPBLANKING	1.2(a4),1.4(a3)
COMPSYNC	1.2(c3),1.3(a1),1.5(b1)
CROWBAR	1.4(b4),1.7(b2)
D	1.3(a3),1.3(c2)
DEF COIL(H)	1.4(b2)
FB	1.3(b4),1.3(b1)
FOCUS	1.4(b4)
H_DRIVE	1.3(a4),1.4(c1)
H_SHIFT	1.3(a2),1.4(a1)
HOLDDOWN	1.3(c2),1.4(a2)
HVSUPPLY	1.3(b4),1.4(b1)
K1	1.4(b3),1.4(c2),1.4(b2)
L4	1.4(b3)
L5	1.4(b3)
L6	1.4(b3)
MP0	1.7(b1)
MP1	1.2(b1)
MP2	1.2(a4)
MP3	1.2(c3)
MP4	1.7(b3)
MP5	1.5(b2)
MP6	1.5(b3)
MP7	1.5(b4)
MP8	1.3(c2)
MP9	1.3(b3)
MP10	1.3(b4)
MP11	1.3(a4)
MP12	1.4(c1)
MP13	1.4(b2)
MP14	1.4(a3)
MP15	1.4(b4)
MP16	1.4(a2)
MP20	1.4(b2)
MP21	1.4(b2)
MP22	1.4(b2)
R2	1.3(b2)
R3	1.7(c3)
R4	1.5(b3)
R5	1.5(a4)
R6	1.5(b4)
R7	1.3(b4)
R8	1.3(c4)
R9	1.3(a2)
R10	1.3(a4)
R13	1.4(b4)
R14	1.4(a4)
R15	1.2(a3)
R53	1.5(c4)
R201	1.3(b4)
R333	1.6(c1)

Mnemonic	Page(coord.)	Connector
S1	1.2(b1)	
SYNC	1.2(b1)	X2
V_BLANK	1.4(a3),1.5(b2)	
V_BRIGHT	1.2(b3),1.6(c3)	
V_SIZE	1.5(c3)	
VBOOST	1.4(a2),1.5(a3)	
VD5	1.3(a1)	
VDYNFOC	1.4(b3),1.5(c2)	
VIDEO_IN	1.2(b1)	X1
VIDEO_OUT	1.2(a4)	X3
W1A	1.5(a1)	
W1B	1.5(a3)	
W2A	1.5(c2)	
W2B	1.5(b3)	
W3A	1.4(b2)	
W3B	1.4(b3)	
W4	1.2(b1)	
W5	1.6(c2)	
W6	1.3(c4)	
W7	1.6(b2)	
W8	1.6(c2)	
W9	1.3(b1)	
W10A	1.3(b2)	
W10B	1.3(b2)	
W11	1.2(b2)	
W29	1.3(b3)	
	1.4(a4)	X4
	1.7(c1)	X5
	1.5(c4)	X6
	1.6(a4),1.6(b4)	X9
	1.6(b1)	X10
	1.6(b4)	X11

Section Z

15' / 17" / 20" Basic Monitor

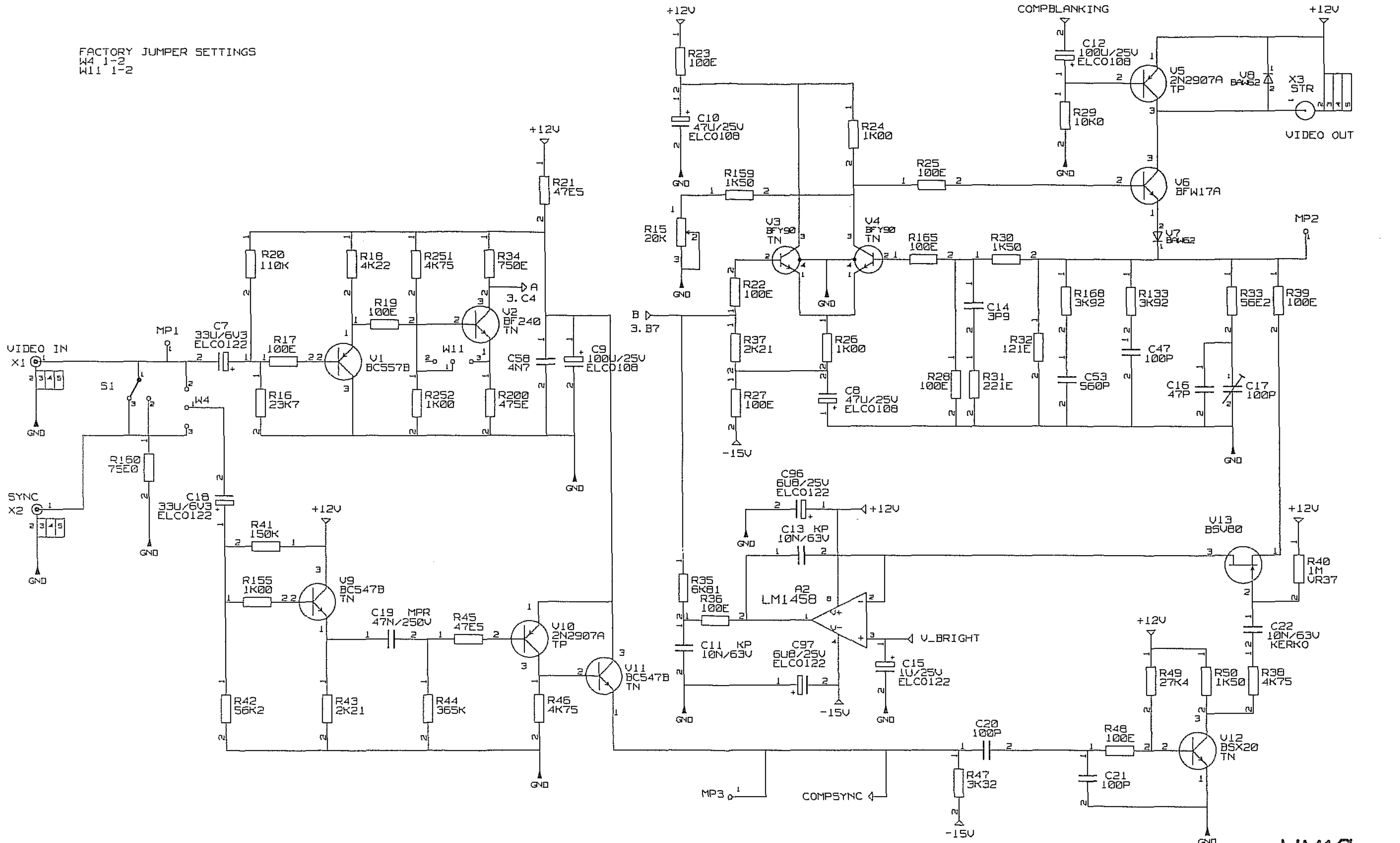


WM10

15" / 17" / 20" BASIC MONITOR

Section Z

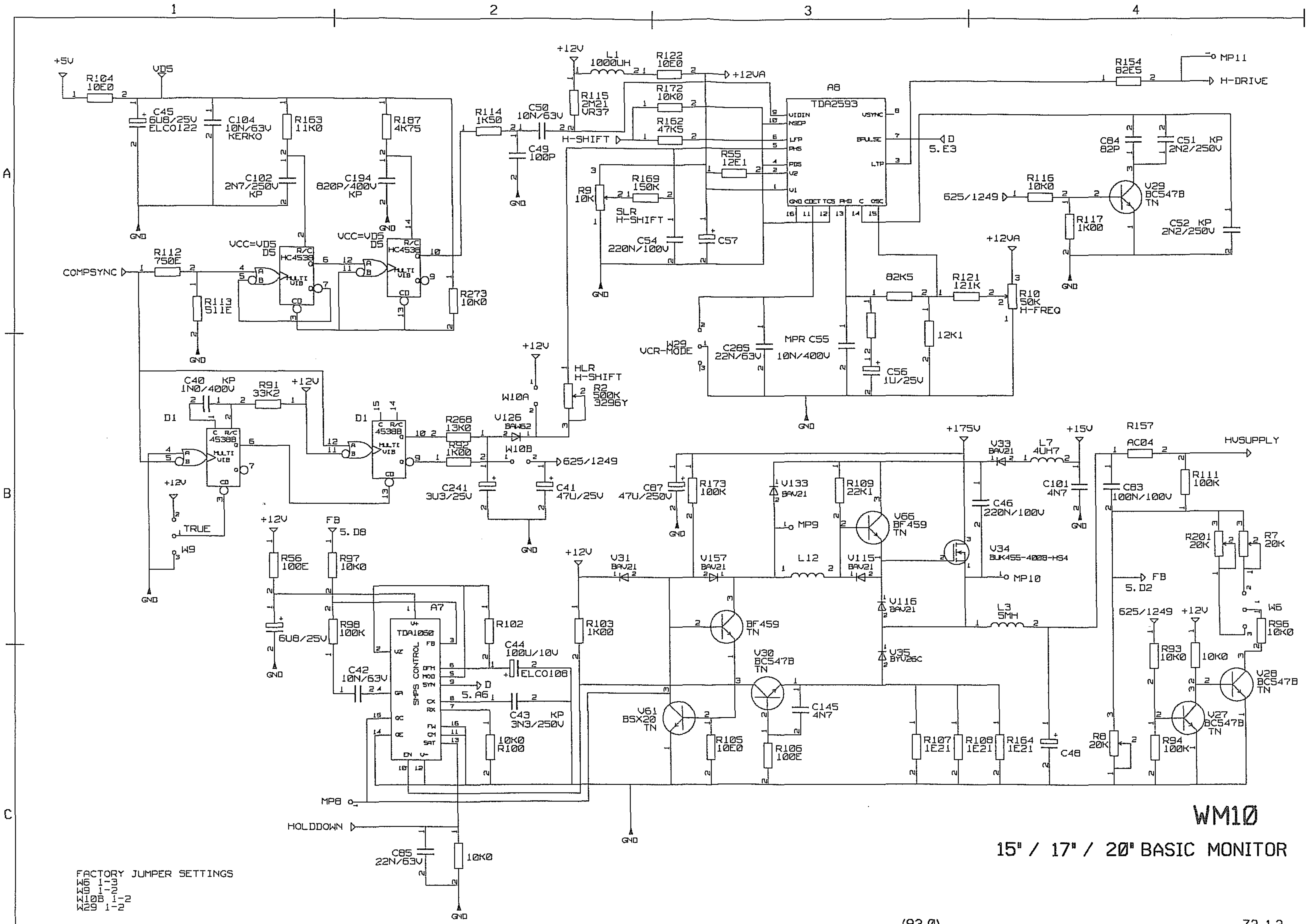
15' / 17" / 20" Basic Monitor



WM10

15" / 17" / 20" BASIC MONITOR

15" / 17" / 20" Basic Monitor



WM10

15" / 17" / 20" BASIC MONITOR

FACTORY JUMPER SETTINGS
W6 1-3
W9 1-2
W10B 1-2
W29 1-2

(93.0)

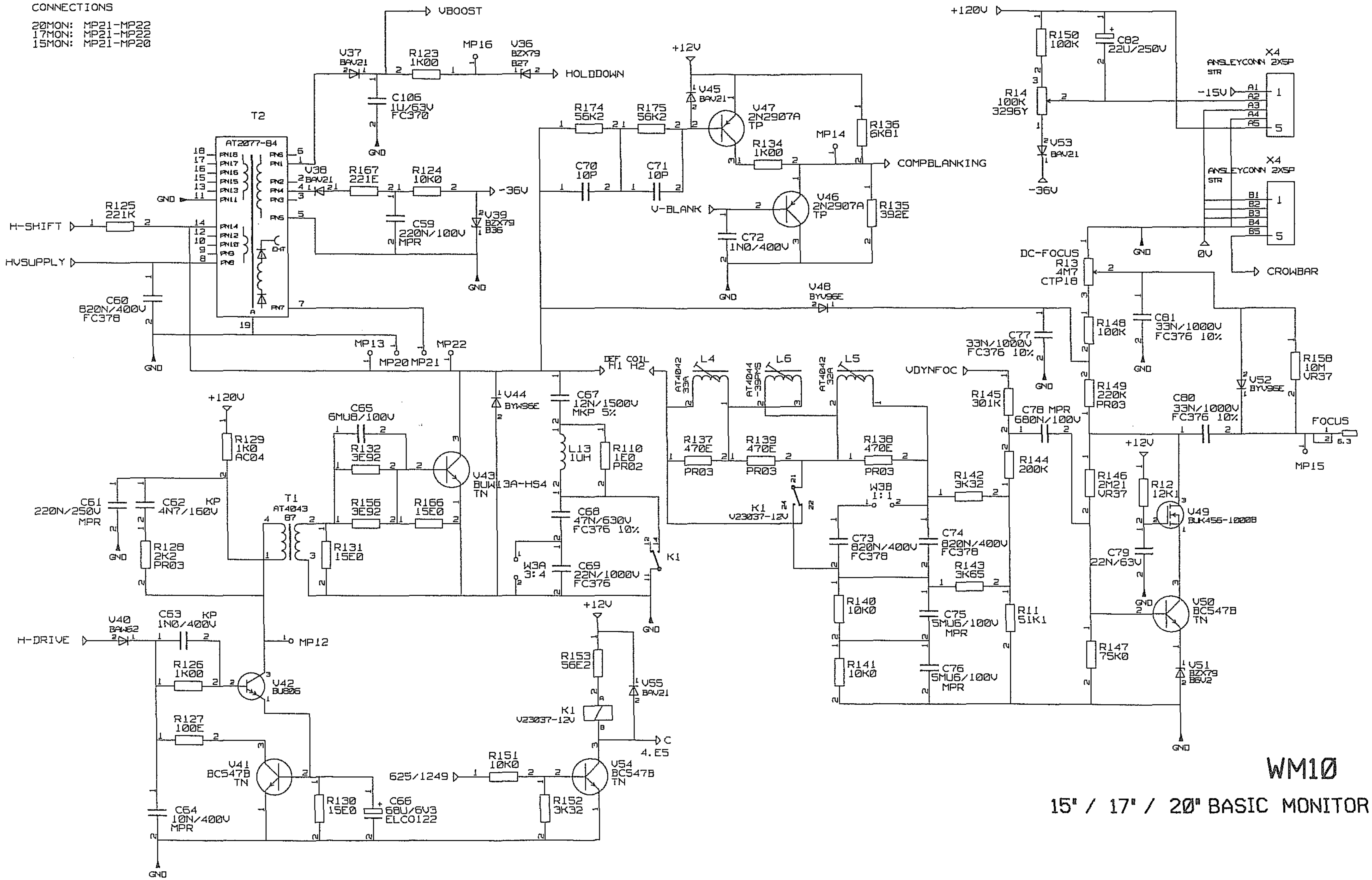
Section Z

15" / 17" / 20" Basic Monitor

FACTORY JUMPER SETTINGS
W3A 1-2

CONNECTIONS

20MON: MP21-MP22
17MON: MP21-MP22
15MON: MP21-MP20

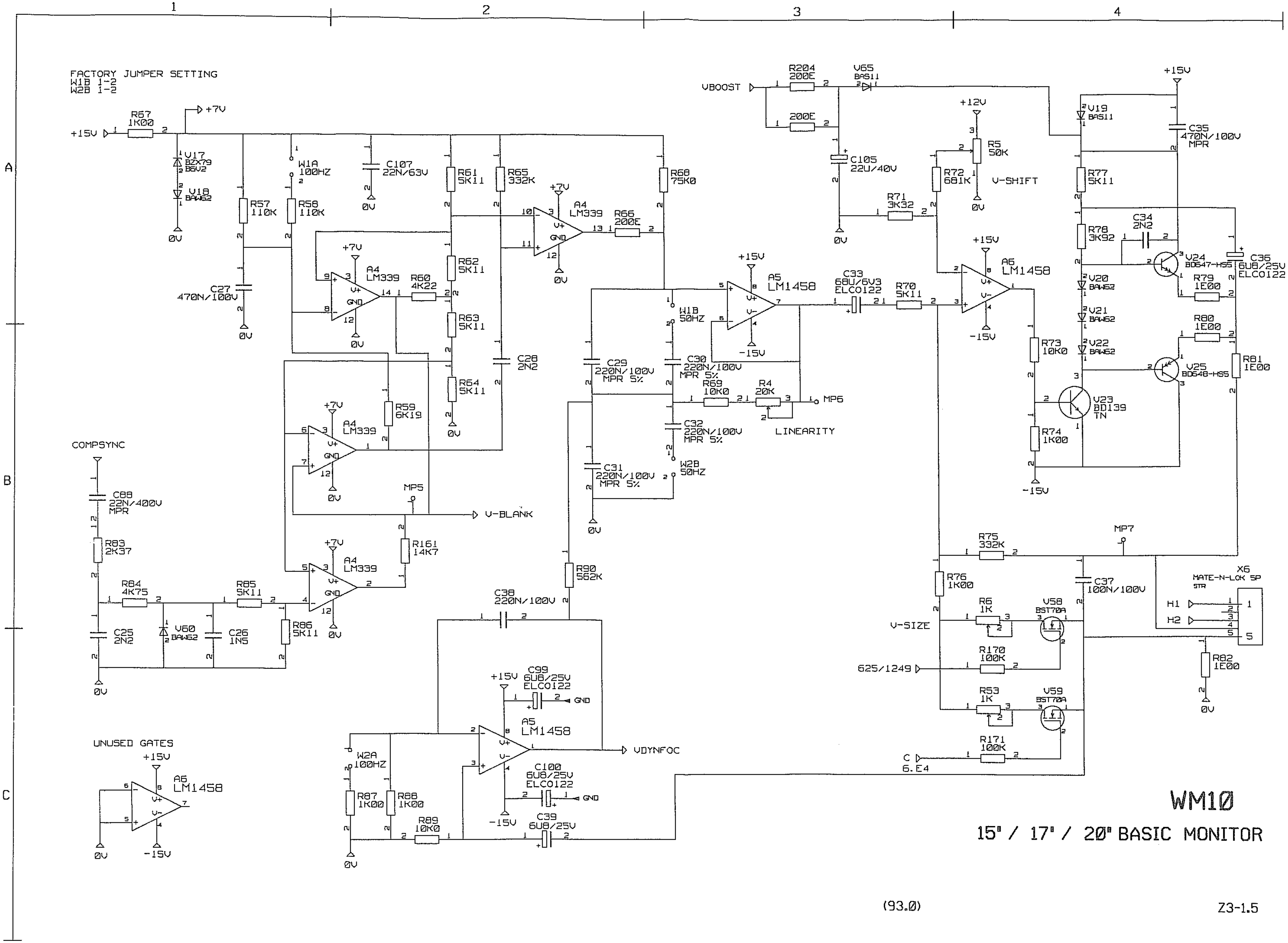


WM10

15" / 17" / 20" BASIC MONITOR

(93.0)

Z3-1.4



Section Z

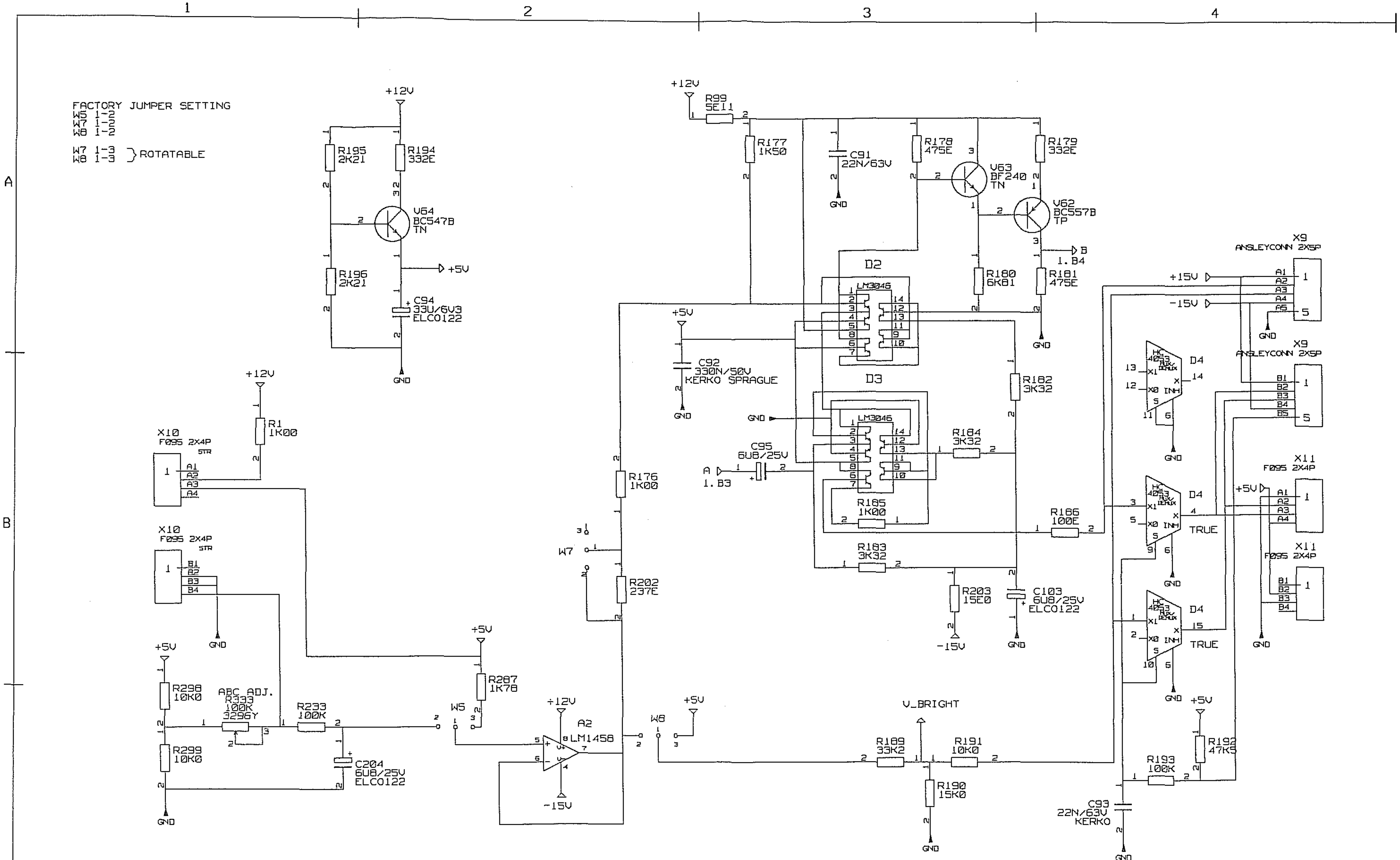
15" / 17" / 20" Basic Monitor

WM10

15" / 17" / 20" BASIC MONITOR

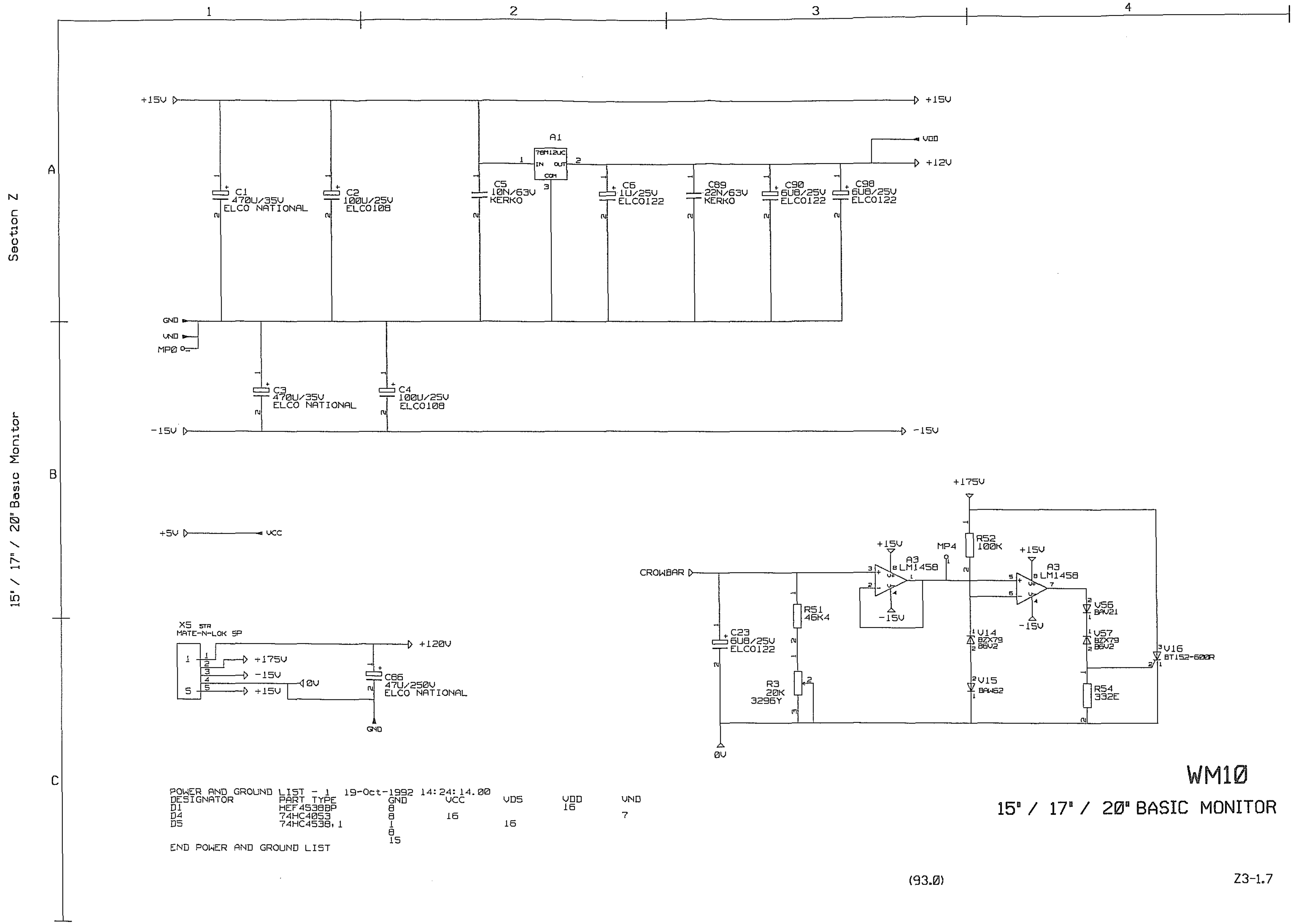
(93.0)

Z3-1.5



WM10

15" / 17" / 20" BASIC MONITOR



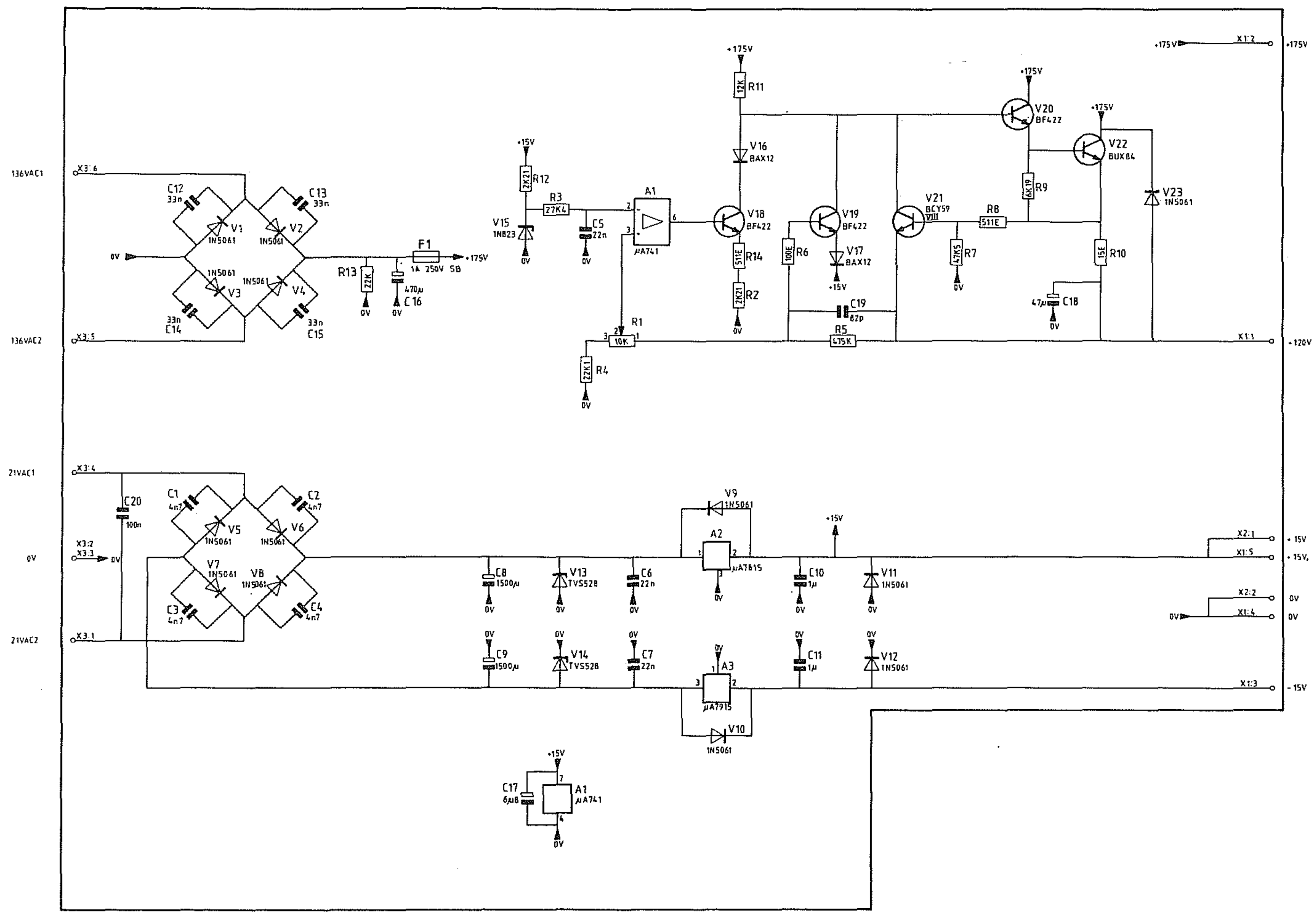
POWER AND GROUND LIST - 1 19-Oct-1992 14:24:14.00

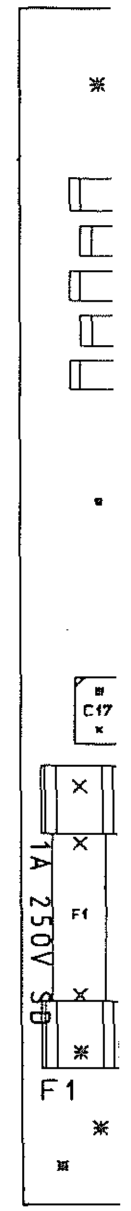
DESIGNATOR	PART TYPE	GND	VCC	VD5	VDD	VND
D1	HEF4538BP	8			16	
D4	74HC4053	8	16			7
D5	74HC4538,1	1 8 15		16		

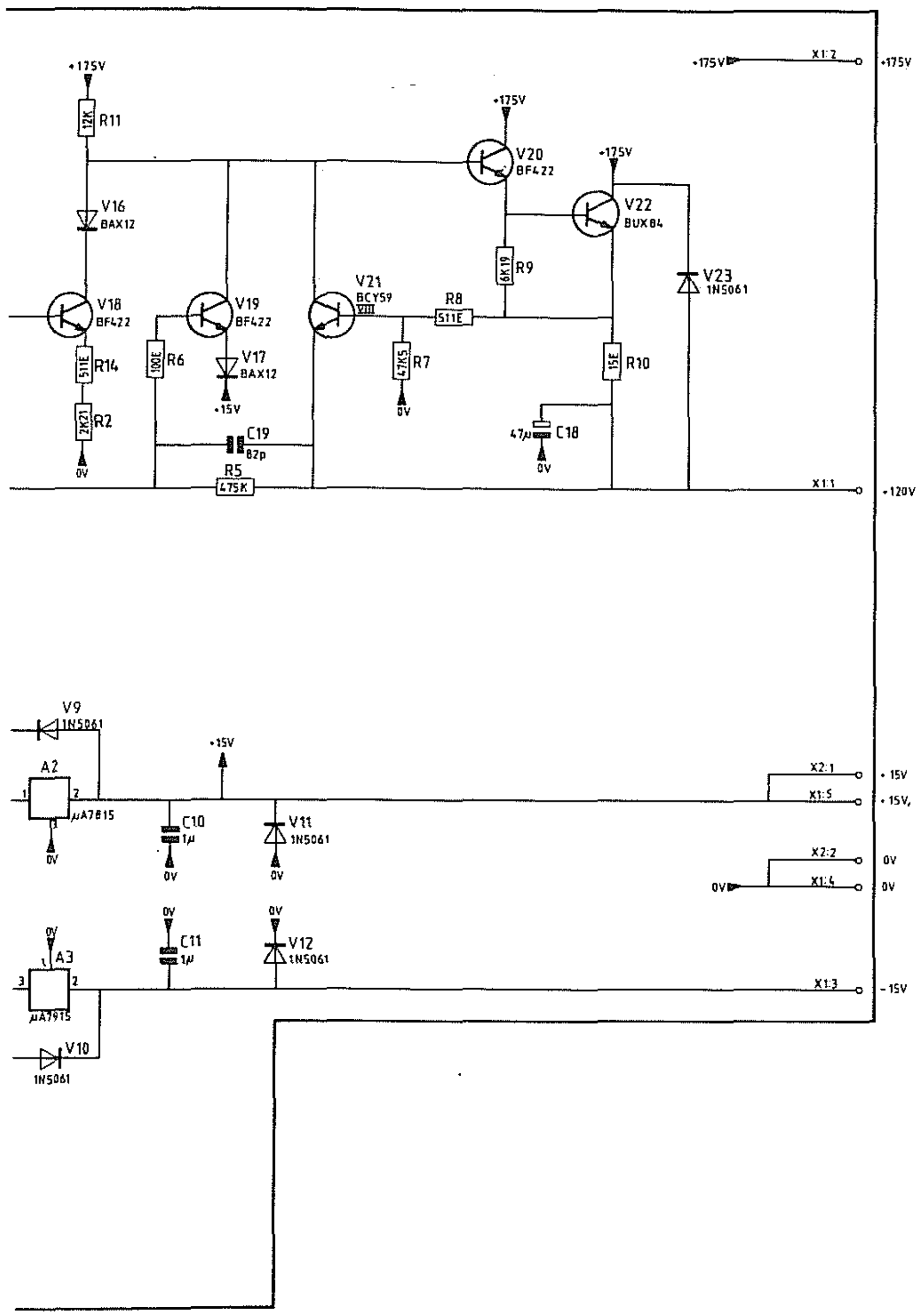
END POWER AND GROUND LIST

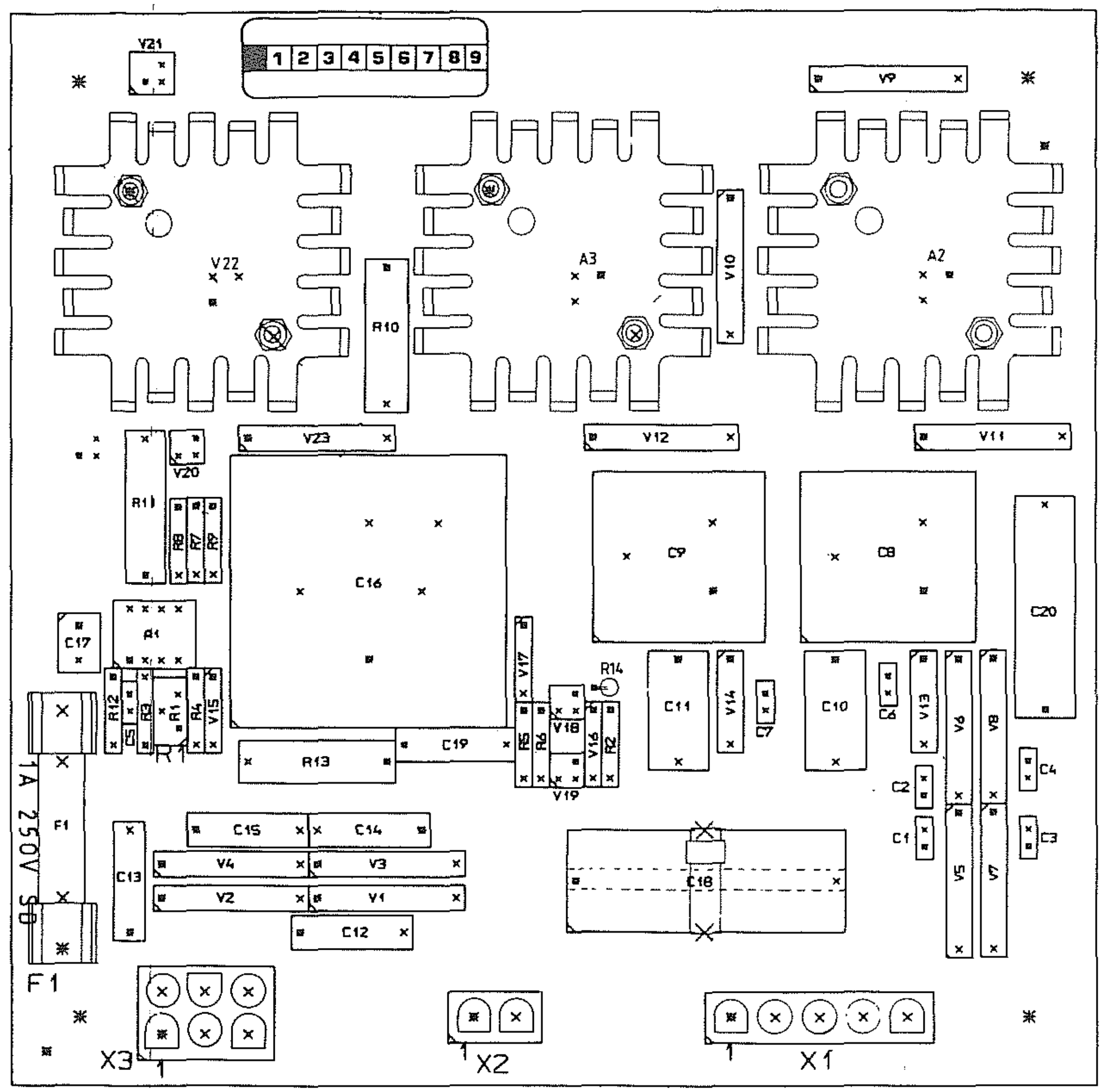
WM10

15" / 17" / 20" BASIC MONITOR


136VAC1
X3:6
136VAC2
X3:5
0V
C12
33n
C13
33n
V1
1N5061
V2
1N5061
V3
1N5061
V4
1N5061
C14
33n
C15
33n
R13
22K
C16
470μ
F1
1A 250V SB
+175V
+15V
R12
2K21
V15
1N823
R3
27K4
C5
22n
A1
μA741
R1
10K
R4
22K1
+175V
R11
12K
V16
BAX12
V18
BF422
R14
511E
R2
2K21
V19
BF422
R6
100E
V17
BAX12
C19
82p
R5
475K
V21
BCY59
VIII
R7
47K5
R8
511E
V20
BF422
R9
6K19
V22
BUX84
R10
15E
C18
47μ
V23
1N5061
X1:2
+175V
X1:1
+120V
21VAC1
X3:4
C20
100n
X3:2
X3:3
21VAC2
X3:1
C1
4n7
C2
4n7
V5
1N5061
V6
1N5061
V7
1N5061
V8
1N5061
C3
4n7
C4
4n7
C8
1500μ
V13
TVS528
C6
22n
V9
1N5061
A2
μA7815
C10
1μ
V11
1N5061
C9
1500μ
V14
TVS528
C7
22n
A3
μA7915
V10
1N5061
C11
1μ
V12
1N5061
X2:1
+15V
X1:5
+15V
X2:2
0V
X1:4
0V
X1:3
-15V
C17
6μ8
A1
μA741


C17
1A 250V SD
F1



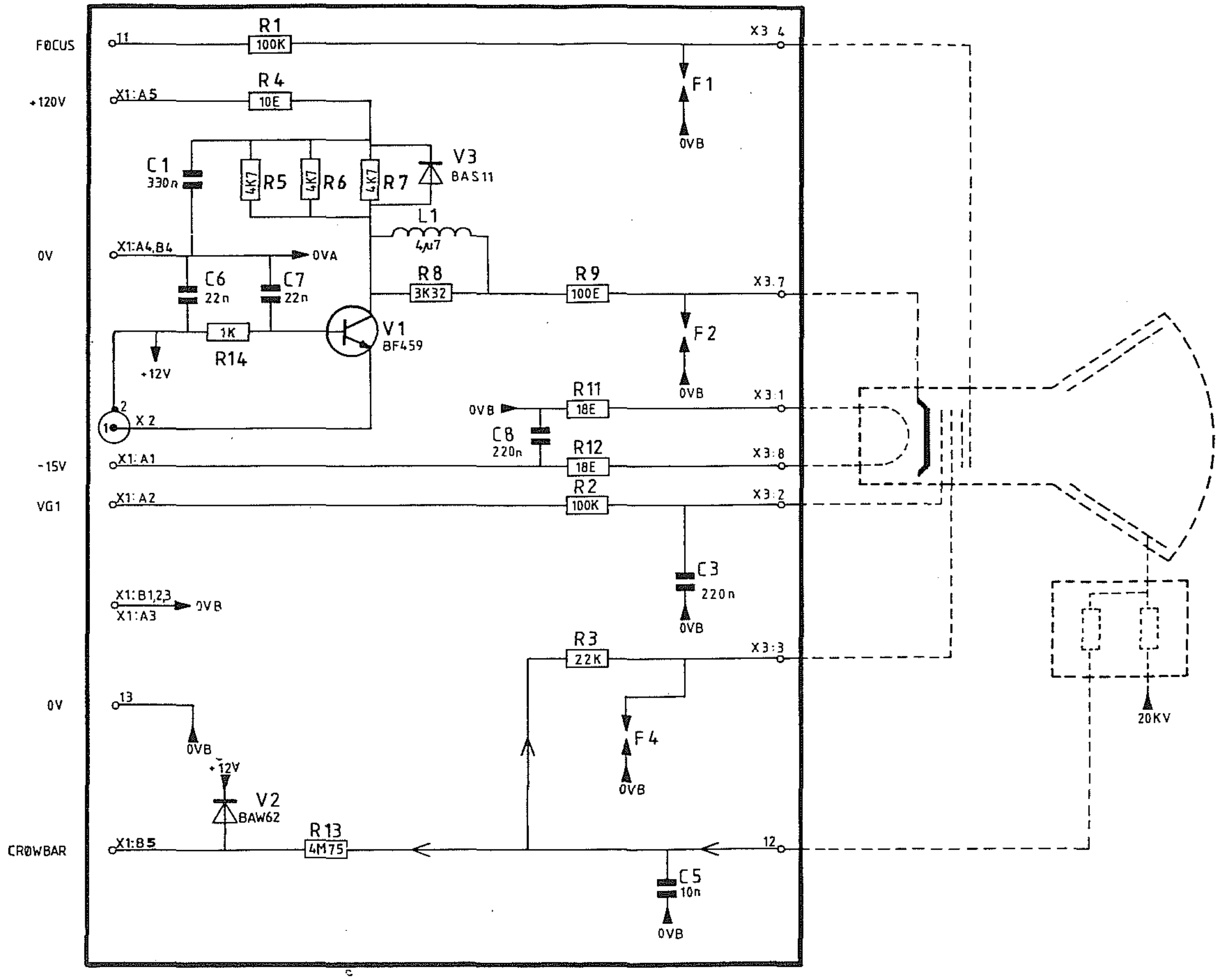


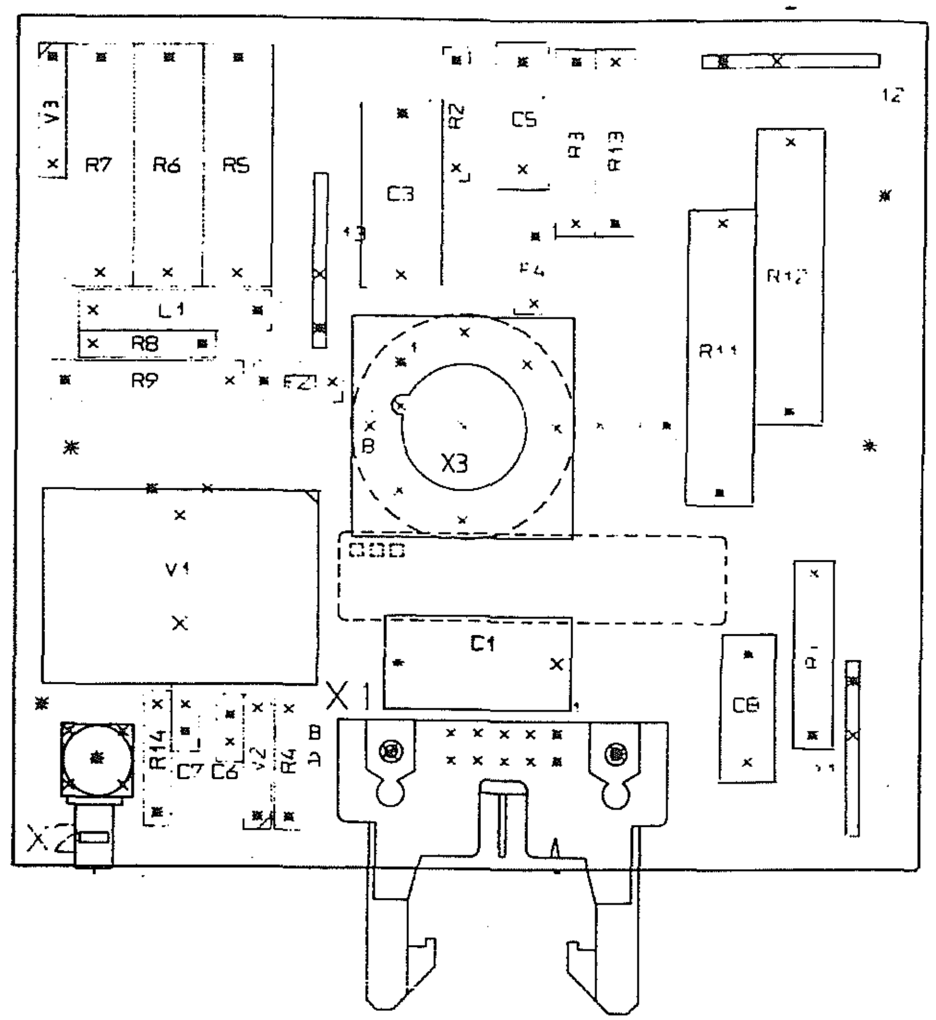
WM20

POWER SUPPLY 4522 107 87853	

Section Z

HM(R)20S 20"TV Monitor

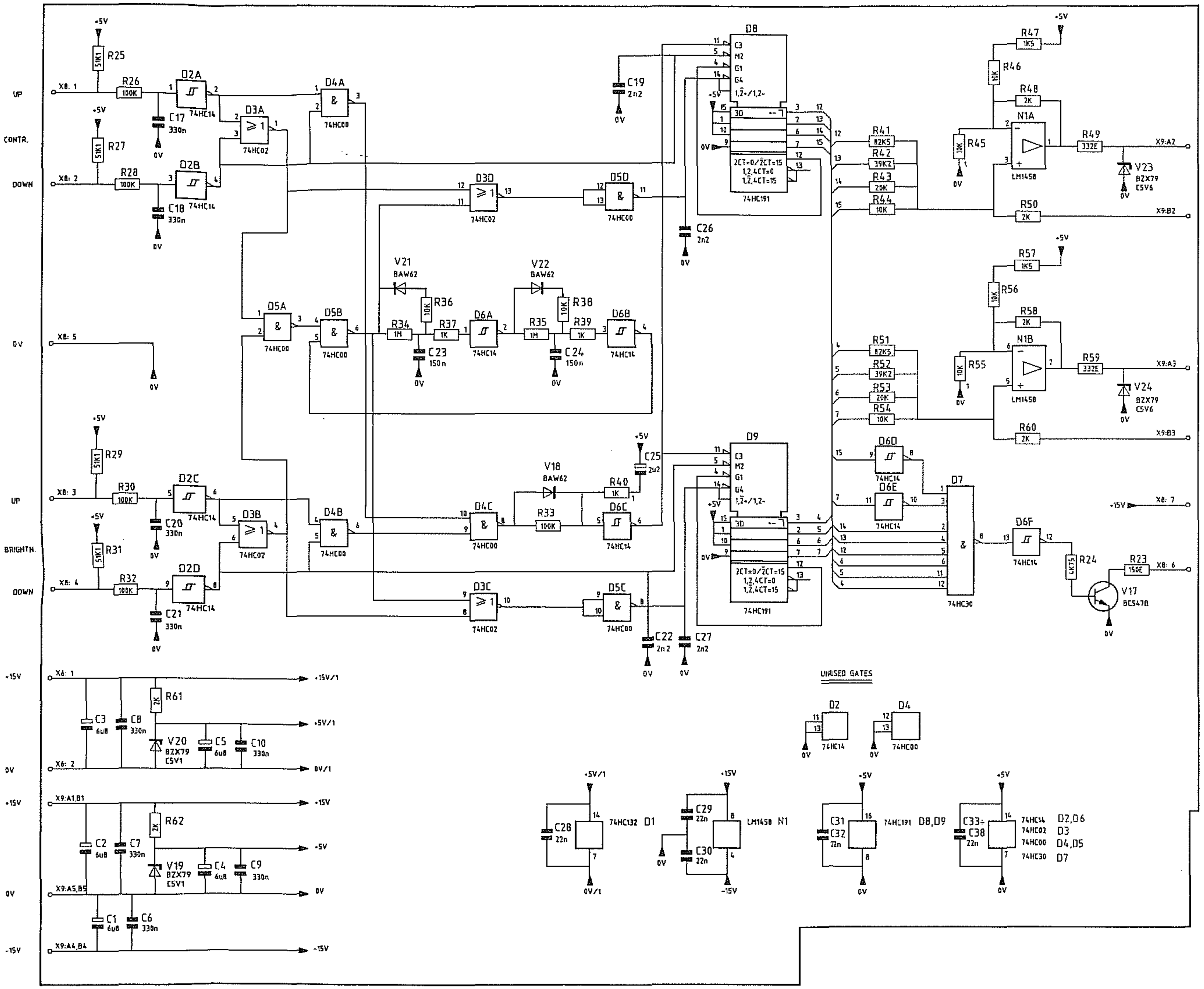




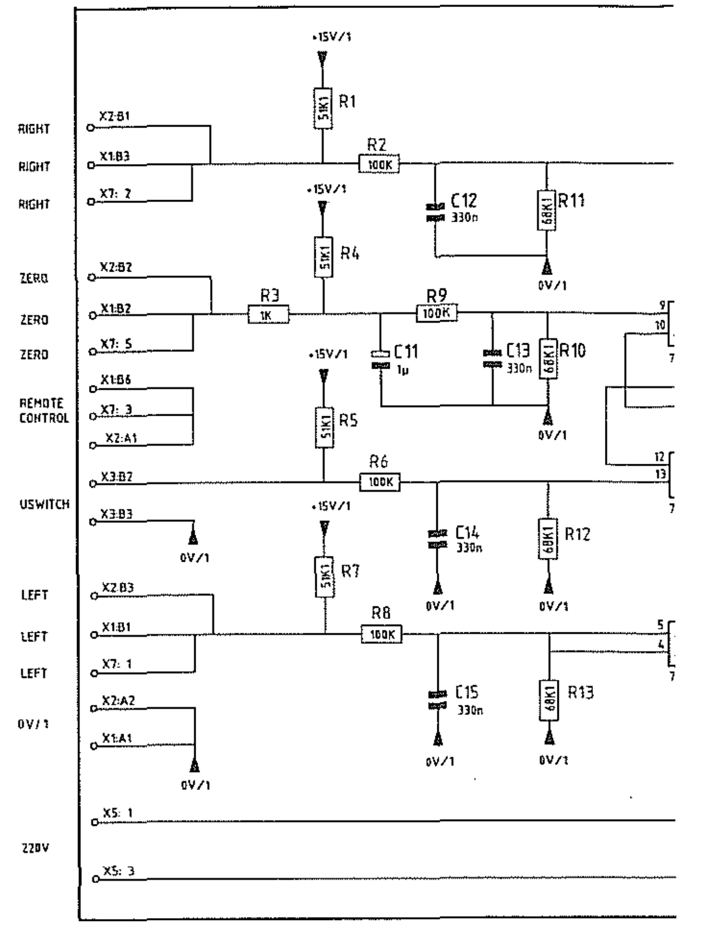
WM30

TUBE SOCKET 4522 107 87805	

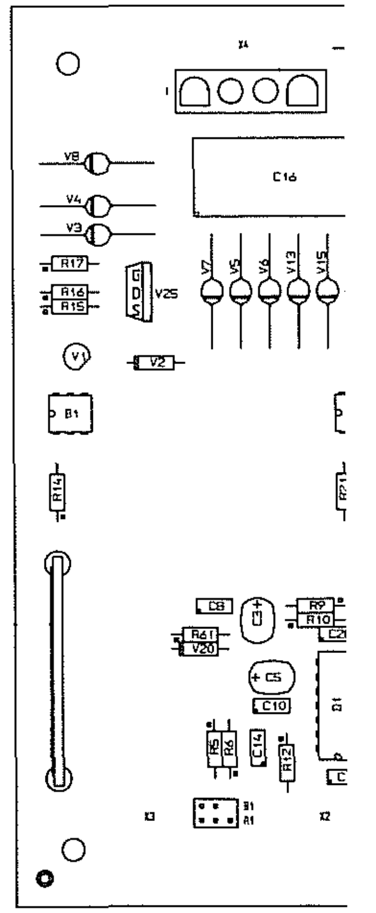
Section Z



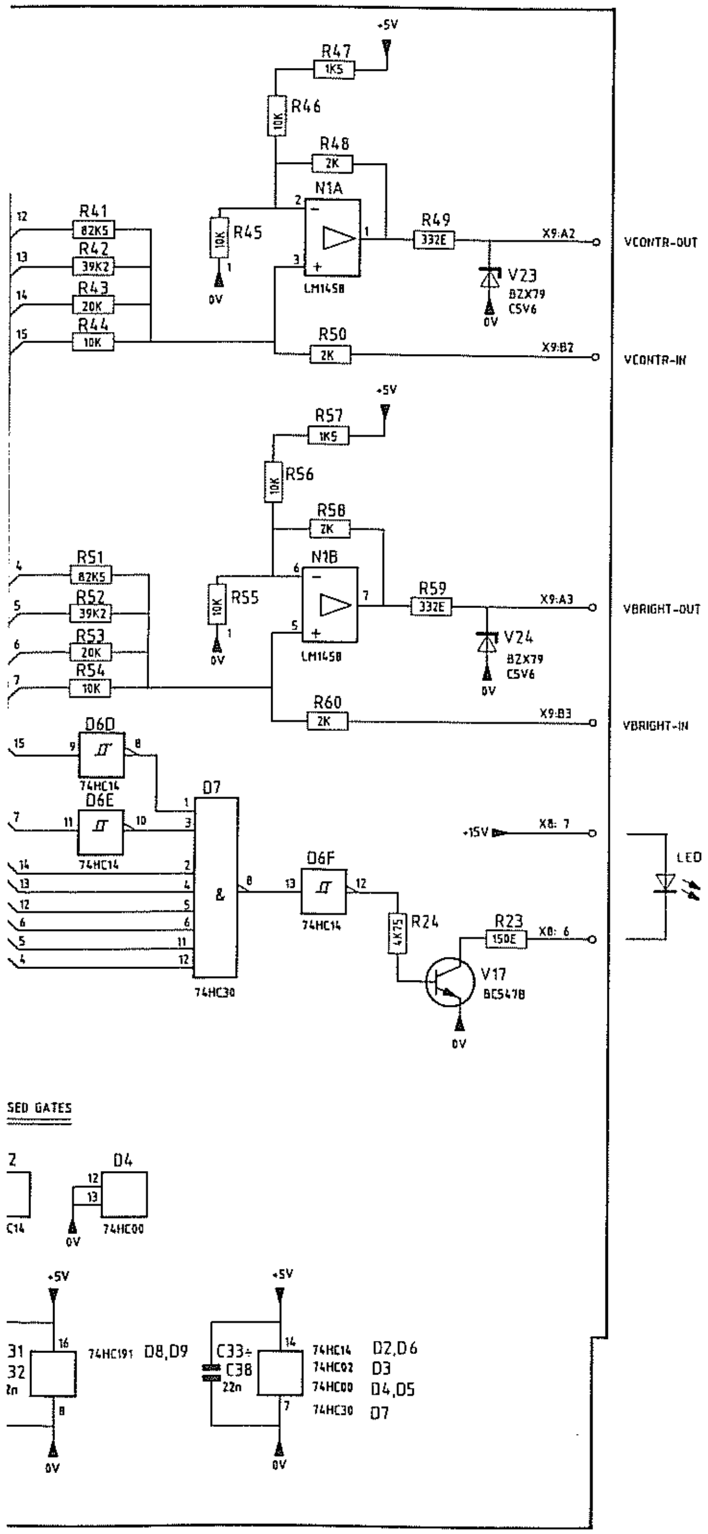
UP
CONTR.
DOWN
0V
UP
BRIGHTN.
DOWN
+15V
0V
+15V
0V
-15V
X8: 1
X8: 2
X8: 5
X8: 3
X8: 4
X6: 1
X6: 2
X9:A1,B1
X9:A5,B5
X9:A4,B4
+5V
R25
R26
R27
R28
R29
R30
R31
R32
D2A
D2B
D2C
D2D
74HC14
D3A
D3B
D3C
D3D
74HC02
D4A
D4B
D4C
74HC00
D5A
D5B
D5C
D5D
D6A
D6B
D6C
D6D
D6E
D6F
D7
74HC30
D8
D9
74HC191
N1A
N1B
LM1458
V17
BC547B
V18
V21
V22
BAW62
V23
V24
BZX79
C5V6
V19
V20
C5V1
VCONTR-OUT
VCONTR-IN
VBRIGHT-OUT
VBRIGHT-IN
X9:A2
X9:B2
X9:A3
X9:B3
X8: 7
X8: 6
LED
+15V/1
+5V/1
0V/1
-15V
UNUSED GATES
D2
D4
74HC132
D1
LM1458
N1
74HC191
D8,D9
74HC14
74HC02
74HC00
74HC30
D2,D6
D3
D4,D5
D7

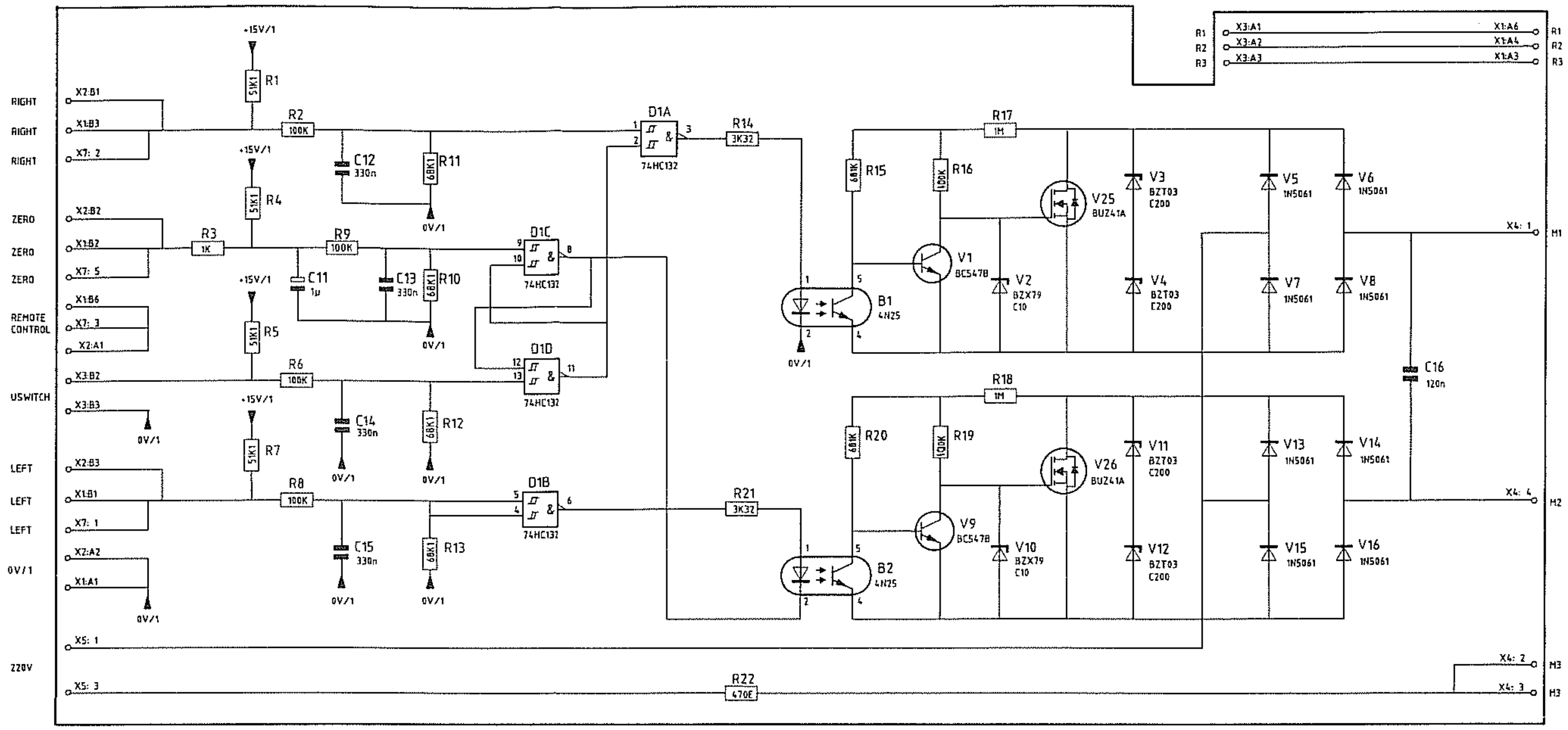


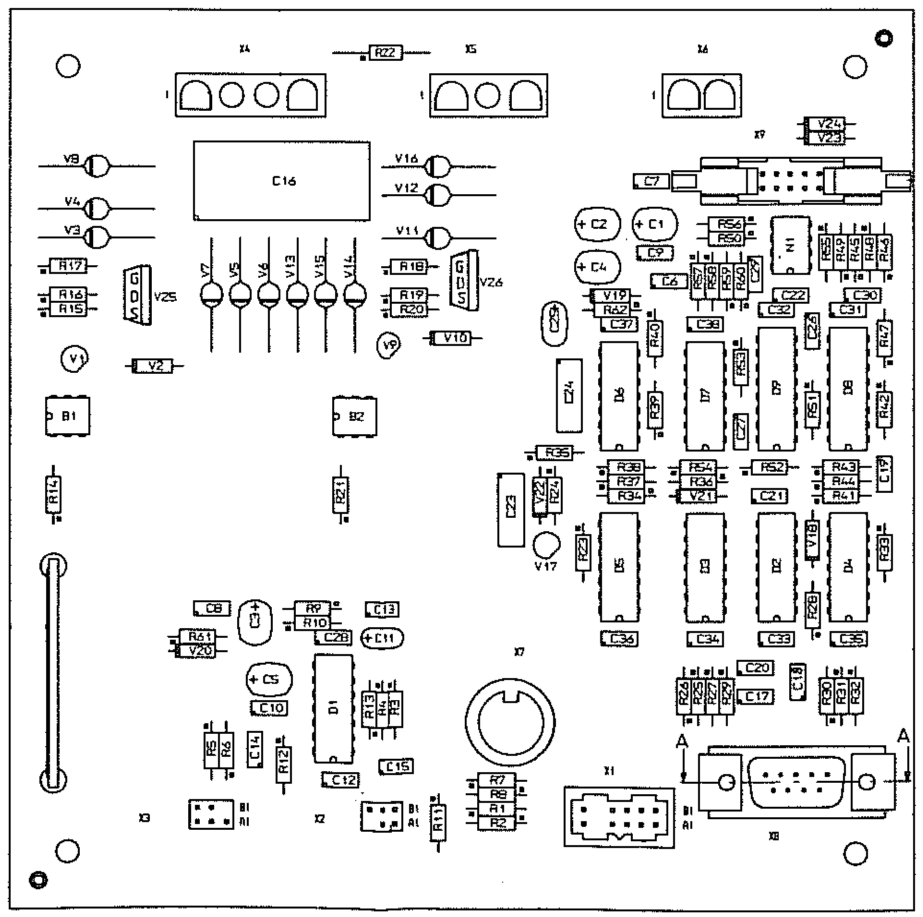
RIGHT
RIGHT
RIGHT
ZERO
ZERO
ZERO
REMOTE CONTROL
USWITCH
LEFT
LEFT
LEFT
0V/1
220V
+15V/1
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
C11
C12
C13
C14
C15
X5: 1
X5: 3



X4
C16
V8
V4
V3
R17
R16
R15
V25
V1
V2
B1
R14
C8
C3
R41
V20
C5
C10
C14
R9
R10
D1







WM60

ROTATION CONTROL 4522 108 10002	

FILING INSTRUCTIONS

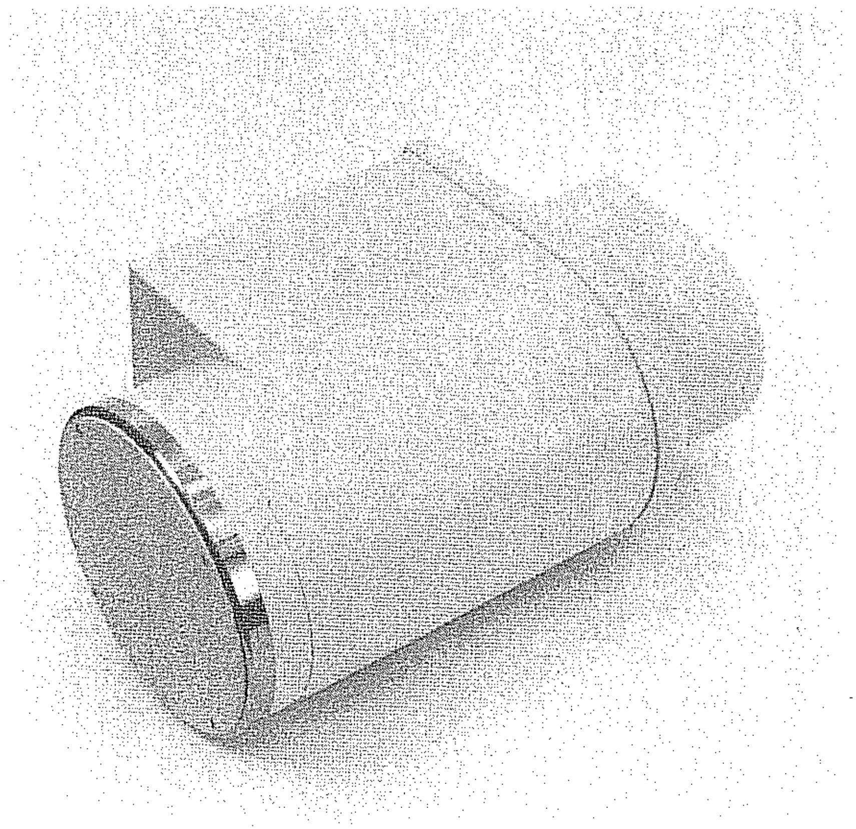
File this documentation in the
IMAGE SUBSYSTEM binder.

SERVICE MANUAL - UNIT

15 cm II tube assembly

9896 010 02321

For serial numbers, see list of pages and drawings



This manual contains descriptive information on the equipment identified by the number stated above. For information on specific application, see the system manual.

PMSN Best

SERVICE MANUAL-UNIT
15 cm II Tube assy
TYPE NO. : 9896 010 02321

SERIAL NO. :

Manual codenumber : 4522 983 54431

List of Pages and Drawings

Contents

1. INTRODUCTION AND TECHNICAL DATA

1.1. PURPOSE

This 15 cm II tube assembly is applied in the mobile surgery. The assembly consists of a 15 cm II container in which the 15 cm II fibre tube has been built. On the II-tube a basic lens with a XTV-8S/SRI can be mounted. The II generator can be built in de side box of the container.

1.2. ITEMS SUPPLIED

The numbers in the list refer to the items in figure (a) on page 25.

Container with the II tube (4). The open space on the photo (arrow) is the side box (1).
A Grid (2) is mounted on the shield with 4 screws (3).
Identification plates in a plastic bag (see para. 1.3. for the location of the plates).
For the 15 cm II tube a separate documentation is supplied with also lenspaper, instruction and test film.

1.3. EQUIPMENT IDENTIFICATION

The identification plates are located on the central labelling station of the system and on the inner side of the camera cover as indicated by the arrow in figure (a) on page 25. Included are the following plates:

- Name and Address plate.
- HHS certification label.
- HHS date of manufacture.
- Manufacturer plate.
- Type number plate with serial number of the 15 cm II tube assembly.
- UL/CSA classification mark.

NOTE

In case of replacement of certifiable items always replace duplicate label on the inside of the camera cover and on the central labelling station "i" of the system.

2. TECHNICAL DATA

2.1. DIMENSIONS AND WEIGHTS

- Overall dimensions: see drawing Z9-1
- Total weight: ≈ 200 N = ≈ 20 kg.

2.2. PROTECTIONS

X-Rays	The container, camera cover and other relevant parts are provide with a lead lining to protect the environment against radiation of x-ray beams which are projected perpendicular to the entrance screen
Magnetic shielding	The container is provided with a mu-metal shielding to minimize the effect of weak alternating or static magnetic fields inside the container. All parts of the container are made of non-magnetic material.
Mechanical	In case the II tube implodes, an implosion plate protects the environment against fragments of the tube.

2.3. GRID PARAMETERS

- Ratio 8
- Focus distance 90 cm
- Lamellae 44 l/cm
- Diameter 208 cm

2.4. ADAPTATION FACILITIES

The 15 cm II tube assembly can be adapted to the following equipment, which are no part of this assembly:

Mobile surgery stand	At the corners of the side box by means of four threaded holes M6 x 12.
XTV camera unit	On the flange between tube and camera compartment by means of three threaded holes M4 x 4, positioned on a pitch circle at angles of 105°, 105° and 150°.
II compact generator	In the side box the II compact high tension generator can be mounted.
Service phantom plate	After removing of the grid a phantom plate can be fitted in two positions (90° rotated) to the front of the container.

2.5. COMPATIBILITY

The 15cm II-tube assembly for surgery is compatible with the following items:

- 15cm II compact generator
- 15cm II-tube
- XTV-8S/SRI camera
- mobile surgery stand (15cm)

2.6. APPLICABLE STANDARDS

The following standards are applicable to the 15 cm II tube assembly.

PMS products are developed and manufactured with observance of a number of directives, regulations and standards. (e.g. International product safety standards as IEC, ISO, CISPR and national performance and product safety as 21CFR Subch. H and J, U.L., CSA, DIN and VDE.)
Information regarding the compliance status with standards and product approvals is obtainable at:

Philips Medical Systems
Corporate Quality Department
Regulation and approbation Group
Building QM 118
PO Box 10,000
5680 DA BEST
The Netherlands
Fax. No. : 31-40-762205/762420
Tel. No. : 31-40-762408
Telex No. : 35000 PHTC NL
routing indicator XLQBUXA

3. Installation

This part contains general mounting instructions. Specific instructions are given in the system manual.

3.1. Tools

This assembly can be installed with a standard toolset.

3.2. Instructions

15 cm II tube	The tube has been fitted in the container in a fixed position by means of a centring ring with pin at the bottom of the tube compartment and the pressure ring with four pieces of rubber tube at the front.
Base ring and pressure ring	See figure (c) on page 26. The base ring and the pressure ring (items 1 and 2) are assembled by means of four adjusting screws with lock nuts (item 3). The base ring is fixed to the container by means of eight screws M4 x 8 (item 4).
Implosion plate	See figure (e) on page 26. This plate (item 1) is fitted with four screws M3 x 6 (item 2).
Ornamental ring	See figure (d) on page 26. The ornamental ring (item 1) is fitted with four screws M5 x 8 (item 2).
Grid	See figure (b) on page 26. the grid is screwed to the front of the container by means of four screws M4 x 8 (item 2).
Camera cover	See figure (a) on page 25. the camera cover (item 4) is fitted to the container by means of three earth washers, three spring washers with three screws M4 x 35 (item 5) and two earth rings with two spring washers and two screws M4 x 45 (item 6).

4. Corrective maintenance

The replacement procedures for the 15 cm II tube has been described in the system manual.

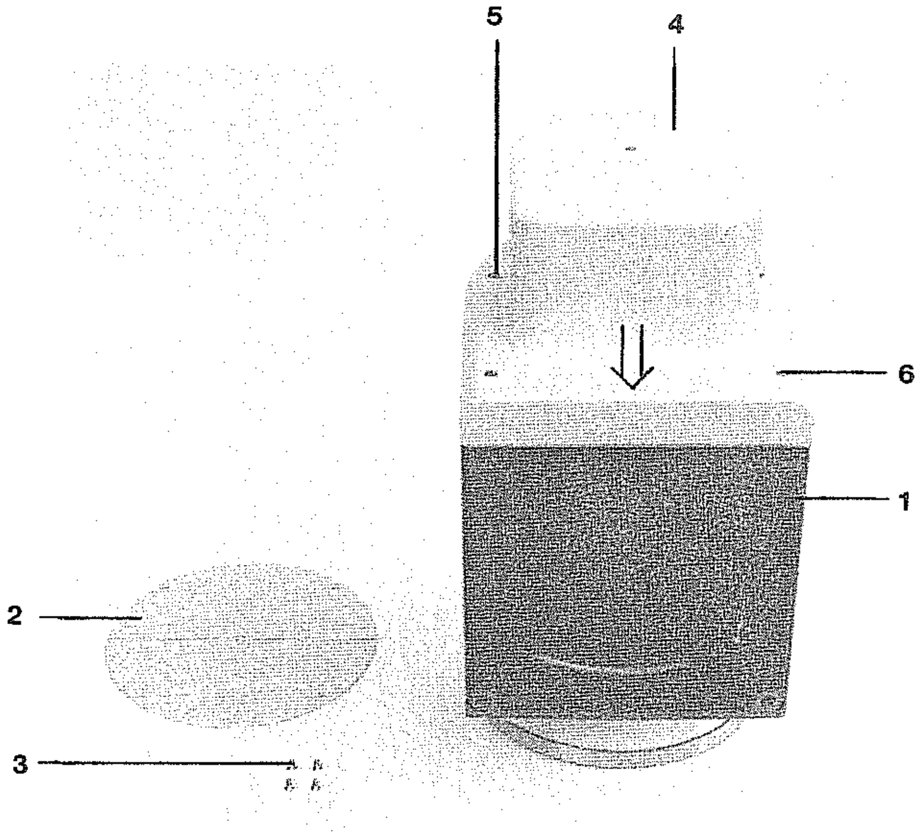


Figure (a)

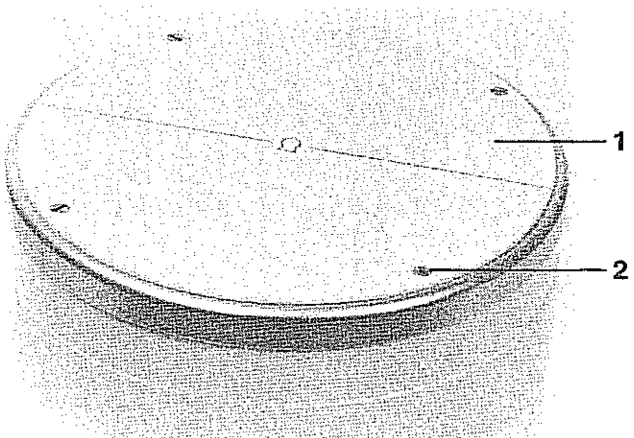


Figure (b)

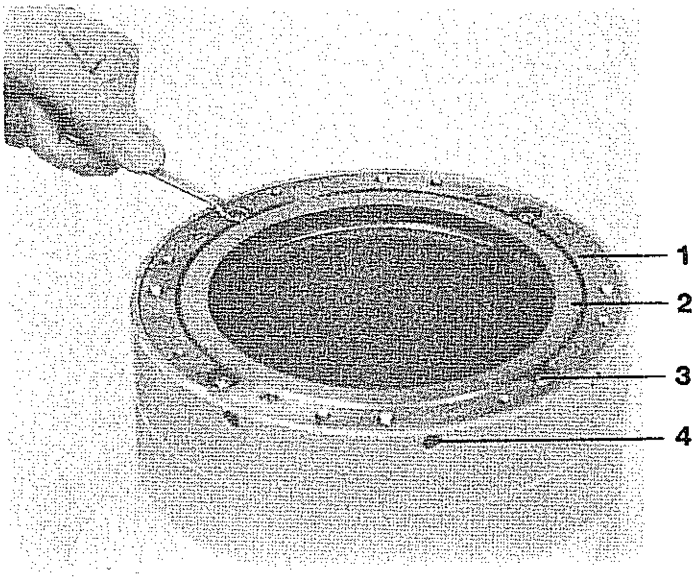


Figure (c)

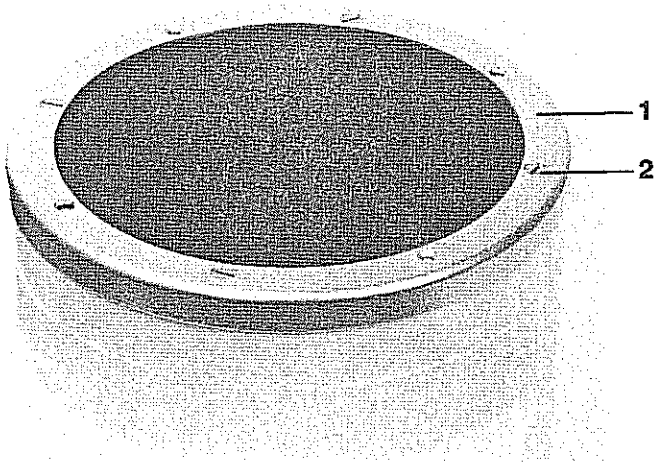


Figure (d)

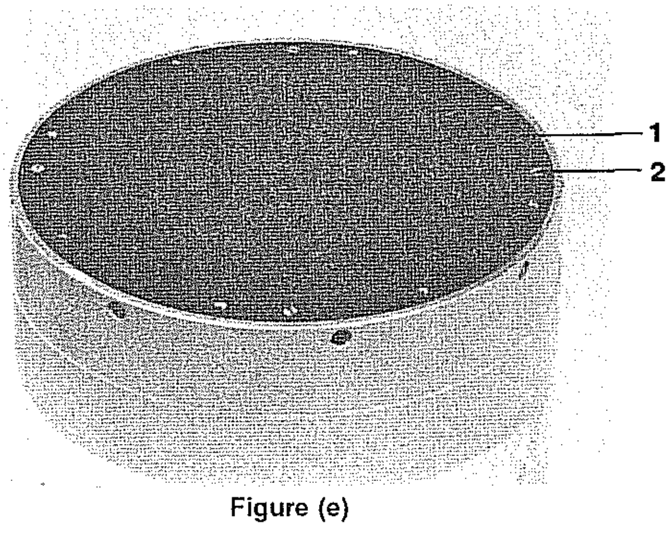
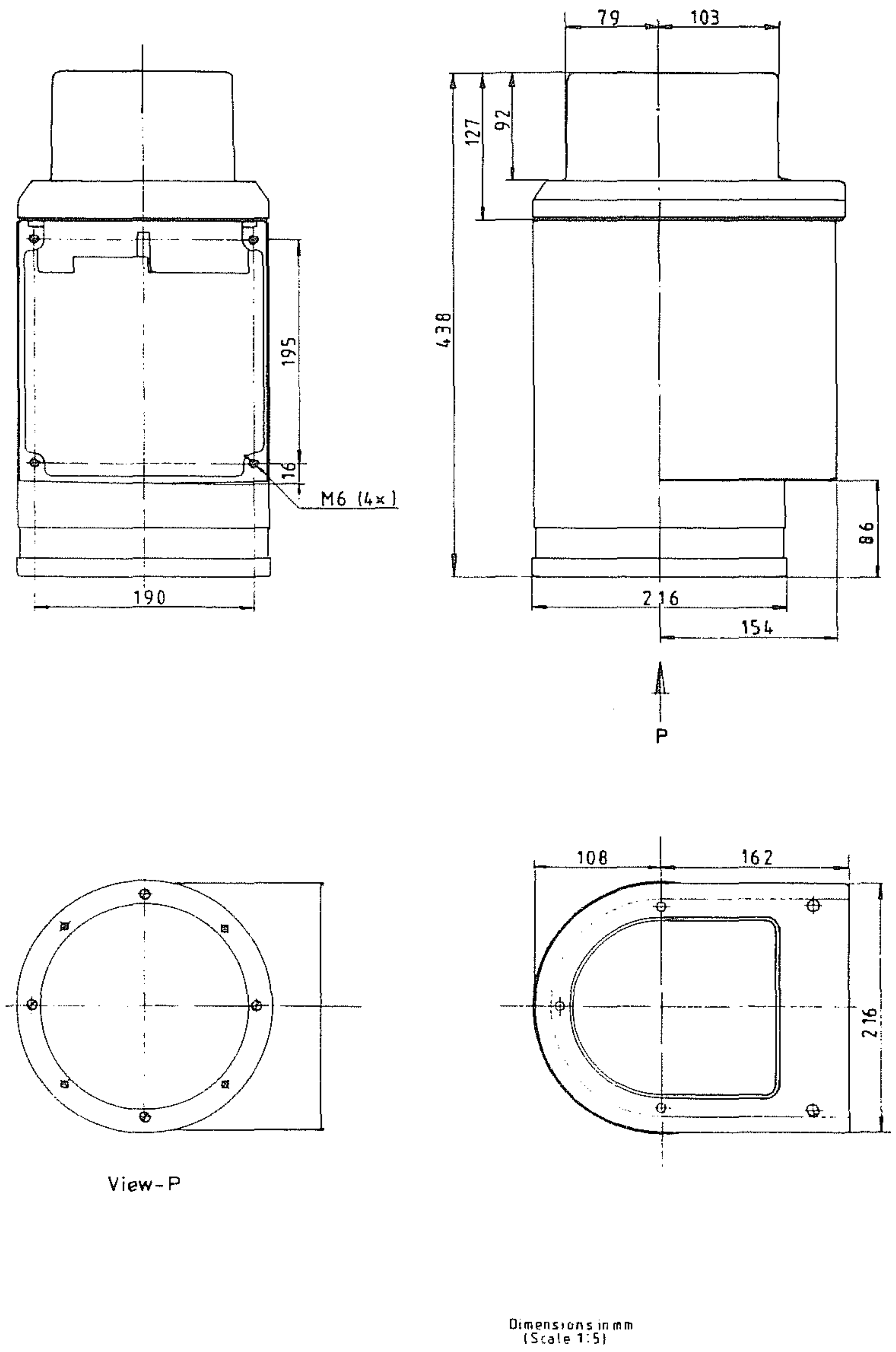


Figure (e)

15 cm II Tube assy



PHILIPS

Philips Medical Systems

Issued by Technical Service

15 CM

SINGLE MODE X-RAY IMAGE INTENSIFIER TUBE

CODENUMBER : 9807 200 13001

ALSO VALID FOR CODENUMBER : 9807 200 22001

Manual order no. 4522 983 85322

INS200130		INSTALLATION INSTRUCTIONS X-RAY IMAGE INTENSIFIER		9807 200 13001		91-05-21
Hendrix			91-03-22	12	590 - 1	010
HK		(C) N.V. PHILIPS' GLOEILAMPENFABRIEKEN 1991				

PHILIPS

1. CONTENTS

PHILIPS

2. Test data:

Test conditions 15 cm. mode			
Name	Abbr.	Connection	Voltage
Anode Voltage	Va	mounting ring	0 V
Photocathode Voltage	Vk	P1	-25 kV
Focussing Electrode Voltage	Vg	P2	Vk + 231 V

Type no. : 9807 200 13001
9807 200 22001

Serial no. : 651.503.07/2 Inspected by:

31/3'95

Test results	15 cm. mode	Unit
Conversion factor	111	$cd/m^2/mR/s$
Visual resolution on output screen *	4.0	lp/mm **

* Average of 2 central measurements.
** Referred to the entrance plane.

- All the tubes are tested in agreement with the IEC-recommendations.
- The test data are determined under the conditions described in "Terms and Definitions for X-ray Image Intensifier Tubes" HKV-TAD000.
- An image quality photograph is enclosed.

3. <u>Guarantee</u>

The X-ray image intensifier is one component in an installation for medical diagnostic use. The specification and design characteristics of the intensifier are matched to the requirements of the complete system.
Image intensifier tubes are guaranteed for the use in the X-ray installation and are guaranteed to be free from defects in material and workmanship. If due to defective material or workmanship, the intensifier becomes deficient in this function within the guarantee period, a replacement will be supplied free of charge, or a credit note given.
The right to make an appropriate repair instead of credit or free replacement is reserved.

<u>Conditions</u>

If the intensifier fails to function correctly in the installation or there are other complaints, a questionaire (as attached) should be completed and sent to the local Philips organisation, together with an adequate description of the fault. If the intensifier functions but with an inadequate performance, a spot film photograph should be taken to demonstrate the failure. For external defects, such as mechanical breakages, a non-medical photograph could be helpful.
After receipt of the questionaire, Philips will assess the most efficient method of handling the complaint.

If the tube has to be returned to the supplier for inspection, it should be sent in its original packing.

The tube must have been handled and stored according to the instructions and recommendations attached.

The tube must have been operated in accordance with the instructions given in the subsystem manual of the related X-ray installation.

4. Handling Instructions

Warning:

This is a vacuum device with a glass input window.
It can implode without warning.

Safety goggles and gloves with wrist protection, shall be worn when handling the tube.

Be very careful: do not bump, or scratch the input, or the output window.

4.1 Transport/Storage

In order to reduce the risk of any small loose particles, that may be in the tube being deposited on the photocathode surface, it is recommended that the tubes be transported, shipped and stored with their longitudinal axis in a horizontal position or in a vertical position with the entrance side upwards.

Long periods of storage at a temperature below - 10 °C or exceeding 35 °C should be avoided.

4.2 Magnetism.

X-ray image intensifier tubes are sensitive to any magnetic field in their vicinity (including the earth's magnetic field). They should therefore be provided with a magnetic shield in order to avoid image blurring and/or distortion.
For hospital applications a mu-metal shield of 0,5 mm thickness as used in the Philips image intensifier container, has been found to be sufficient (see fig. 1).

The shielding effect depends considerably on the direction of the magnetic fields with respect to the image intensifier tube axis.
This effect is maximum for a magnetic field perpendicular to that axis and minimum for a magnetic field parallel to it.

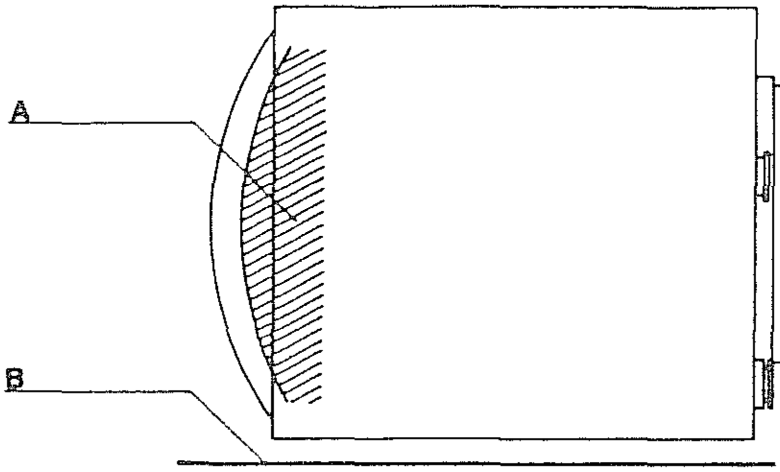


fig. 1 A = In this region the tube is very sensitive to magnetic fields.
B = Cylindrical magnetic shielding required in the container.

Magnetic fields may cause the following problems:

- The image may be misaligned (out of the centre).
- If there is a relatively strong magnetic field the image may not be round.
- S-distortion and/or image rotation may occur.
- The resolution of the tube may be decreased.

4.3 Mounting

When the tube is stored, or being handled and mounted, care should be taken that the tube is not exposed to high intensity light; fluorescent lights in particular should be avoided.
The tube should be handled in subdued light, e.g. normal room lighting or lower.
The surface of the output window should be kept clean and free from dust particles.
Dust or fingerprints can be removed with lens paper.
Move the lens paper linearly over the output window, do not make rotating movements.
Only if necessary use a little ethanol 96% (NLN-1322 501 33001) to remove any grease.
Never use other solvents.

<u>Do not use ethanol if not strictly necessary</u>

<u>Never use other fluids!</u>

5. Accessories

5.1 Plastic output cover

This cover is used to protect the output section against dirt.
Before mounting the tube in the container this cover must be removed.

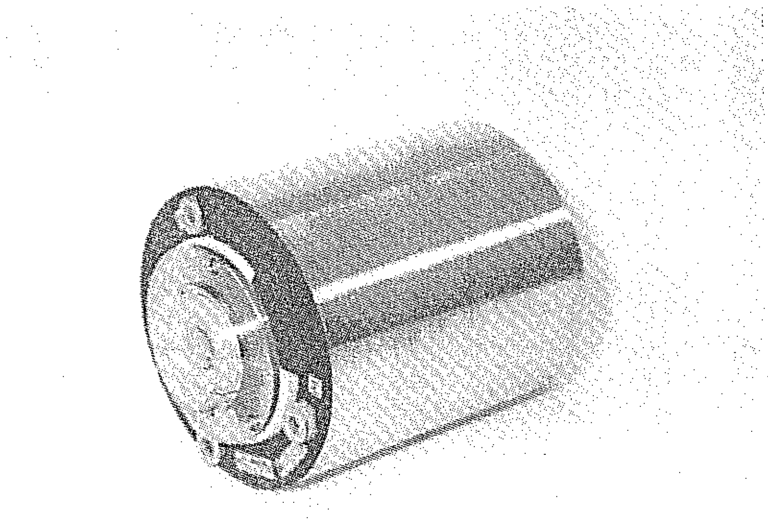


Fig. 2 Image intensifier tube

5.2 Supporting ring

If necessary, the tube can placed on this supporting ring.

5.3 Magnetic shielding

This shielding is not an adequate protection for use in operation, but serves as protection against magnetic fields during transport and storage.
When the tube is mounted in the container this shielding should be removed.

5.4 Documentation

Documentation includes test-data and image quality photograph.

5.5 Plastic tubing to protect the HT-connections P1 and P2

These pieces protect the high tension connections against dirt and must be removed before mounting the tube in the container.

6. Electrical connection

6.1 Connections

Connection	Function
Mounting ring	Anode Voltage (Va)
P1	Photocathode Voltage (Vk)
P2	Focussing Electrode Voltage (Vg)
P4	Ion-pump Voltage (Vp)

For detailed information, refer to the manual of the system.

6.2 Ion pump for gettering

The tube is provided with an ion pump.
Normally, in a modern system e.g. with a compact generator, the magnet ion pump is continually connected to the power supply.

If a gas spot (bright spot in the centre of the image) occurs in the tube, there are two possibilities;

1) Power is not being supplied to the pump. In this case see par. 6.3.
2) The tube has not been used for some time, allowing the gas to build up. In this case switch the power supply on for half an hour. Then there should be a decrease in the visibility of the gas spot. Continue pumping until the gas spot has completely disappeared. Normally this is achieved within half an hour, sometimes however it is necessary to pump the tube for a few hours.
   If the gas spot remains the tube has a leak and must be replaced.

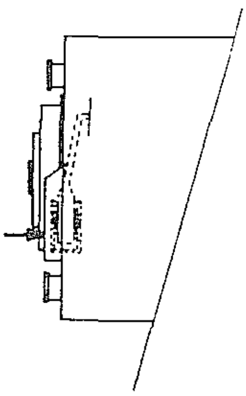
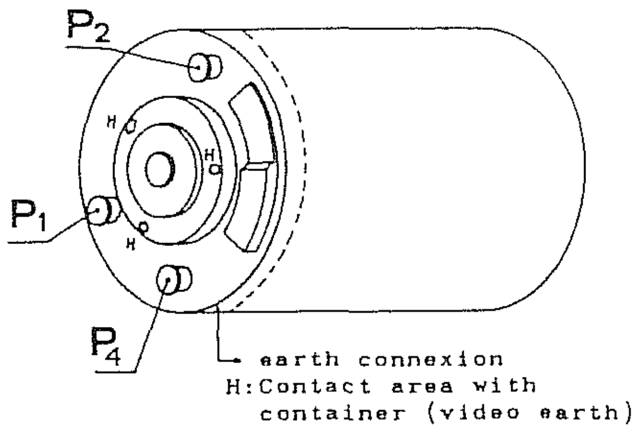


Fig. 3a



Electrical connections

6.3 Connection of the ion pump and measurement of the current

The pump connection has two wires. One is internally connected to the tube earth, and the other is plug P4. The tube earth is the mounting ring and the casing.
A high tension power supply must be used with its negative output connected to P4, and its positive to earth. The required voltage is -2 kV ± 100 V.
Because of this design one has to make a distinction between the II-tube mounted in the system shield (6.3.1), and the II-tube separated from the system shield (6.3.2)

Note: Sometimes the ion pump does not start and therefore the pump current is zero. If this occurs, one has to expose the II-tube for a few seconds to radiation (X-ray) in order to start the pump.

6.3.1 When the II-tube is mounted in the system shield, the coating of the II-tube is automatically earthed and so the pump current can only be measured in the high tension lead.
If one wants to measure the pump current, then either use a current meter (0 - 1000 nA) with -2 kV input isolation to earth (fig. 3b), or use a power supply with an output for current measurement (fig. 3c).

Fig. 3b

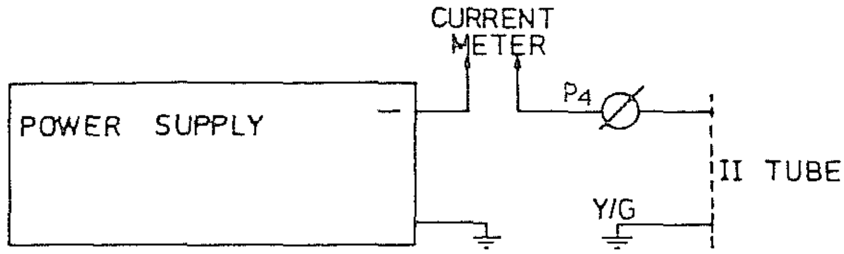
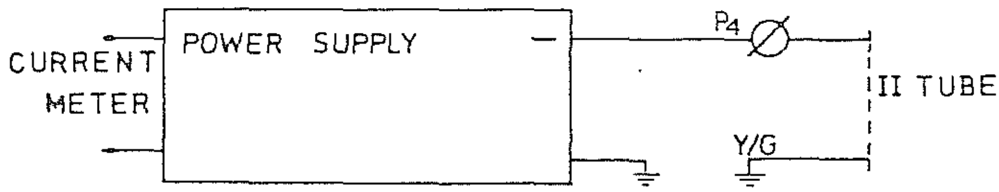


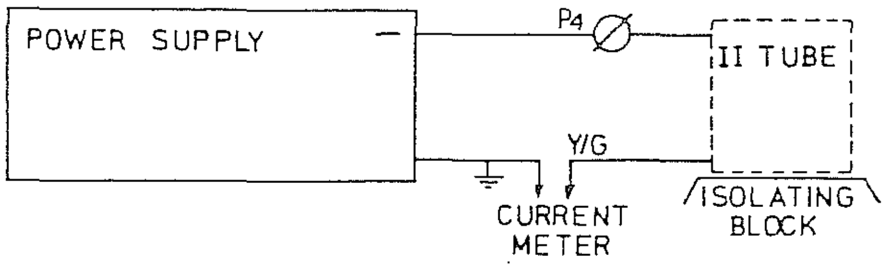
Fig. 3c



If neither method can be used, it is always possible to pump the II-pump without measuring the pump current, and look again at the gas-spot after a few hours.

6.3.2 When the II-tube is outside the shield and all the wires are disconected, the pump current can be measured in the earth wire of the power supply. Ensure that the II-tube is isolated from earth (fig. 3d).

Fig. 3d



PHILIPS

Medical Systems

EXAMPLE

PHILIPS

QUESTIONNAIRE

Address Supply Center

Nederlandse Philips Bedrijven B.V
Postbus 50
6400 AB Heerlen

NO. 0382017

RETURN AUTHORISATION

NO.

Identification number to be mentioned on documents and packing.

Please, do not return goods unless you have received return authorisation number.

For all claims including quaranty and insurance this questionnaire will have to be used.

National Organisation/Dealer

Philips Med. Systems Inc. 710 Bridgeport Ave. Shelton

Owner of goods: PMSI Shelton

User of goods: Memorial Med. Ctr. Hollywood

Item description: 15 cm Image Intensifier Tube

Supply Centre Order-No.

Type-No. or Code-No.: 9807 200 13001

Serial No.: 651 1030112

Received with Invoice-No.: 4251425

Date of invoice: 910415

From apparatus

Serial No.

Goods are components from system

Copy 1 and 2 (green) to Supply Centre
Copy 3 (red) pack with goods
Copy 4 (orange) keep with your file

Condition of the equipment: ☐ originally packed ☐ new ☐ mechanical-defect ☒ electrical-defect ☐ damaged

Reason for return: ☐ repair ☐ credit ☐ replacement ☐ entry in statistics

In operation from: 910402 untill 910411

Way of return after repair: ☐ normal ☐ other way

Return address NO/Dealer

PMSI Shelton

Detailed Report: Explain in detail, reason for returning the goods and for quaranty claim. State customer's complaints, electrical and mechanical condition in which you found the equipment. Explain what kind of tests or repairs have already been made. Please, save unnecessary expenses by giving a detailed description of the defect.

Reason, e.g: After a week of satisfactory operation, bright flushes were seen in the TV-monitor. The frequency of the flashing increased over a few days until it reached a level of 1 per 2 minutes.
Replacing the II tube cured the fault.

Name J. Brown Date 910418 Signature: J Brown

15 cm BASIC LENS ASSY

9896 010 02241

FILING INSTRUCTIONS

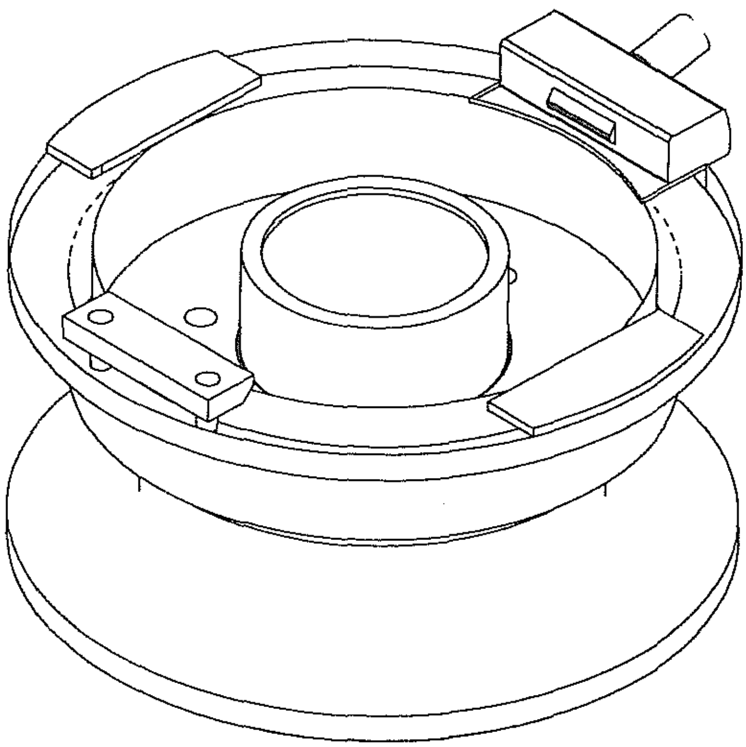
File this documentation in the IMAGE SUBSYSTEM binder.

SERVICE MANUAL - UNIT

15 cm basic lens assembly

9896 010 02241

For serial numbers, see list of pages and drawings



This manual contains descriptive information on the equipment identified by the number stated above. For information on specific application, see the system manual.

PMSN Best

1. Introduction and technical data

1.1. Introduction

The 15 cm basic lens assembly serves for image transmission from the output screen of the II tube to the XTV-8S camera. The XTV-8S camera can be mounted directly on the basic lens assy by means of a quick locking device.

1.2. Described items

See page Z6-1

- coupling ring
- O-ring
- basic lens
- lens holder
- locking device

1.3. Equipment identification

The location of the type number plate is .....

1.4. Technical data

1.4.1. Performance

The assembly is provided with the necessary X-ray shielding to fulfil the HHS safety regulation with regard to perpendicular and oblique radiation.

The basic lens (XR Heligon 54 mm) is prefoccused. After mounting the assembly to the II tube no adjustments are necessary.

1.4.2. Dimensions and weight

Dimensions : 76 x 150 x 135 (h x w x d)
Weight : N.

1.4.3. Environmental data

Ambient temperture	: 0 to 40 C
Relative humidity max.	: 90 %

1.5. Tools and test equipment

The basic lens assembly can be installed with a standard toolset.

2. Installation

The Basic lens is delivered in a factory assembled and adjusted -II/TV subsystem- and no mechanical adjustments are required in the field.

3. Replacements

3.1. Basic lens

See drawing on page 6.

(1) Take the camera from the basic lens housing.

(2) To protect the II fibre output screen from being damaged: The basic lens to the fibre has to be fully parked inwards the basic lens, by putting a hexagonal screwdriver in the three visible holes [1] and turning the three M4 socket head screws [2] fully to the right (inwards). The basic lens is moving upwards.

(3) Then remove the coupling-ring from the lens holder, 4 normal screws [3].

(4) Now the basic lens is visible. Loosen the three black screws with springs [4] and take out the basic lens.

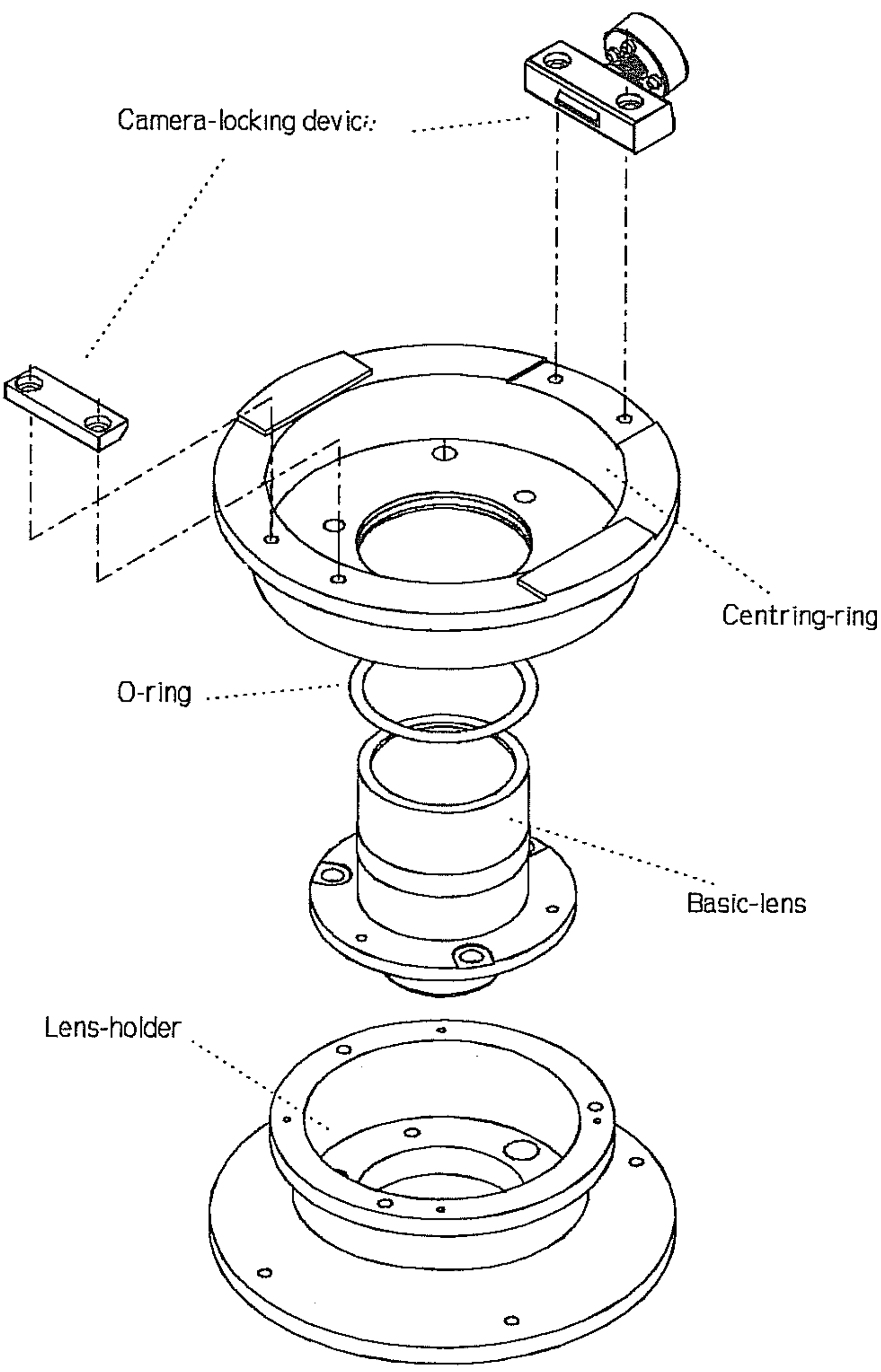
(5) Remove the three screws with the cap nuts [5] from the defective basic lens and place them on the new base lens. The cap nuts have to be sealed with lock nut e.g. loctite 242. Turn these screws entirely in the ring because otherwise the lens will stick out of the housing and will damage the fibre of the image intensifier output screen when placing the base lens in the housing again.

(6) Place the basic lens in the housing and fix it with the three screws and the three springs [4].

(7) Place the coupling ring on the lens holder. Take notice of the position of the screws with the cap nuts because the holes in the coupling ring must be in line with these screws for the next step. Fix the coupling ring with the four screws [3]

(8) Now, the basic lens must gently be placed against the II fibre output screen, by gently equally turning the three screws [2] (accessible through the three holes [1] in the coupling ring) to the left (outwards) e.g. one turn at the time, in a circular sequence one after another until they are secured.

(9) Mount the camera on the basic lens assembly.


Camera-locking devic.:
Centring-ring
O-ring
Basic-lens
Lens-holder

Philips Medical Systems

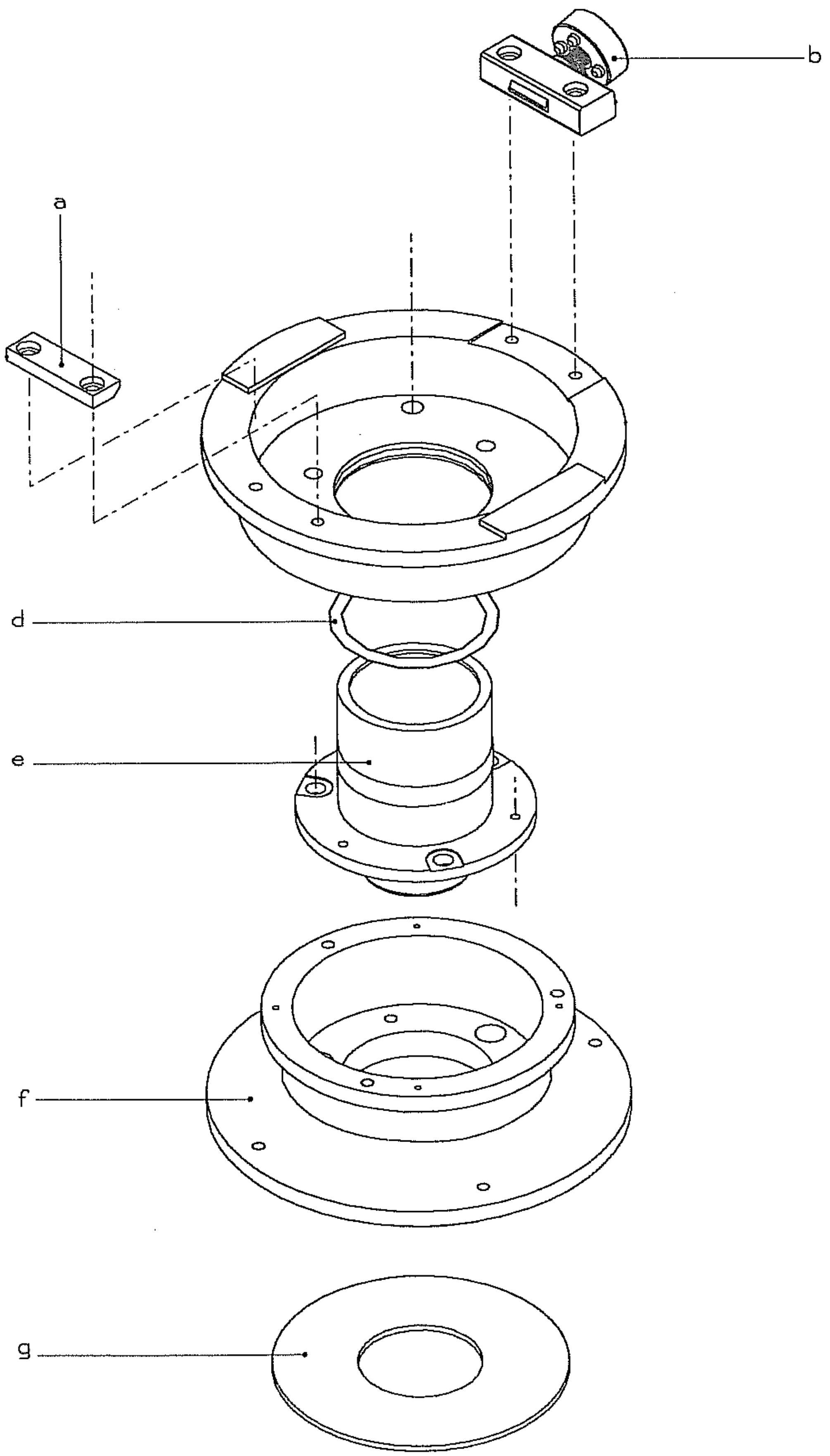
PARTS LIST

Service

Description	: BASIC LENS ASSY 15 CM II FOR XTV8S	**Ref. No.**	: 9896 010 02241
Publication No.	: 4522 983 33921	**Product Group**	: 744

LIST OF PAGES AND DRAWINGS

SCHEME/ PAGE 1	INDEX 2	CODENUMBER 3	DESCRIPTION 4	DATA 5
		2622 115 03056	pressure spring	3x
PZ-1	a	4522 161 68783	locking strip	
PZ-1	b	4522 161 84461	locking device assy XTV-8	
PZ-1	c	4522 161 68923	centring ring	
PZ-1	d	2622 080 90758	O ring 49.5 x 3	
PZ-1	e	4522 161 69081	objective helegon 54MM	
PZ-1	f	4522 161 68841	lens holder	
PZ-1	g	4522 161 72141	lead ring	


b
a
d
e
f
g

9896 010 02241

15 cm BASIC LENS ASSY

FILING INSTRUCTIONS

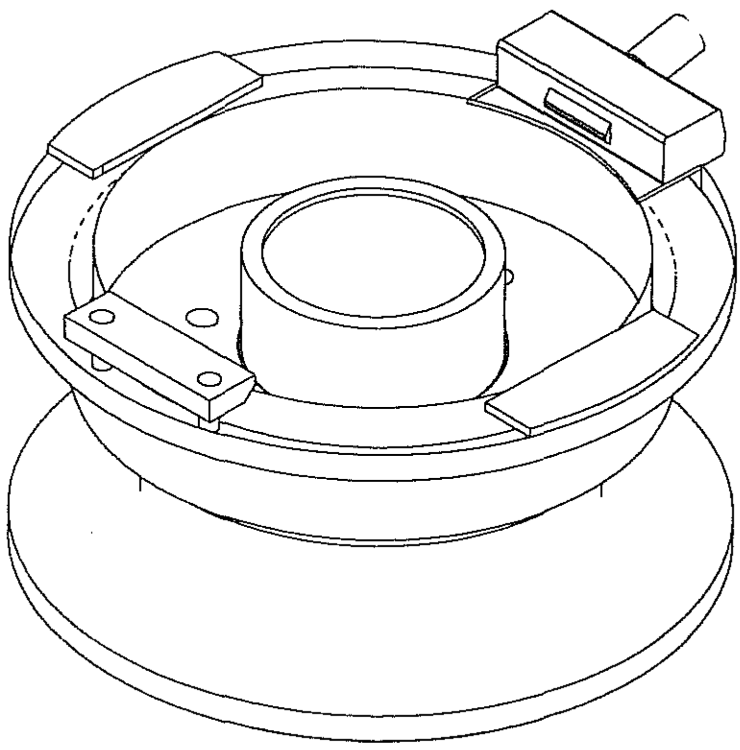
File this documentation in the IMAGE SUBSYSTEM binder.

SERVICE MANUAL - UNIT

15 cm basic lens assembly

9896 010 02241

For serial numbers, see list of pages and drawings



This manual contains descriptive information on the equipment identified by the number stated above. For information on specific application, see the system manual.

PMSN Best

SERVICE MANUAL-UNIT
23 cm basic lens assy
TYPE NO. : 9896 010 02251

SERIAL NO. :

Manual codenumber : 4522 983 53531

List of Pages and Drawings

Contents

1. Introduction and technical data

1.1. Introduction

The 15 cm basic lens assembly serves for image transmission from the output screen of the II tube to the XTV-8S camera. The XTV-8S camera can be mounted directly on the basic lens assy by means of a quick locking device.

1.2. Described items

See page Z6-1

- coupling ring
- O-ring
- basic lens
- lens holder
- locking device

1.3. Equipment identification

The location of the type number plate is .....

1.4. Technical data

1.4.1. Performance

The assembly is provided with the necessary X-ray shielding to fulfil the HHS safety regulation with regard to perpendicular and oblique radiation.

The basic lens (XR Heligon 54 mm) is prefoccused. After mounting the assembly to the II tube no adjustments are necessary.

1.4.2. Dimensions and weight

Dimensions : 76 x 150 x 135 (h x w x d)
Weight : N.

1.4.3. Environmental data

Ambient temperture : 0 to 40 C
Relative humidity max. : 90 %

1.5. Tools and test equipment

The basic lens assembly can be installed with a standard toolset.

2. Installation

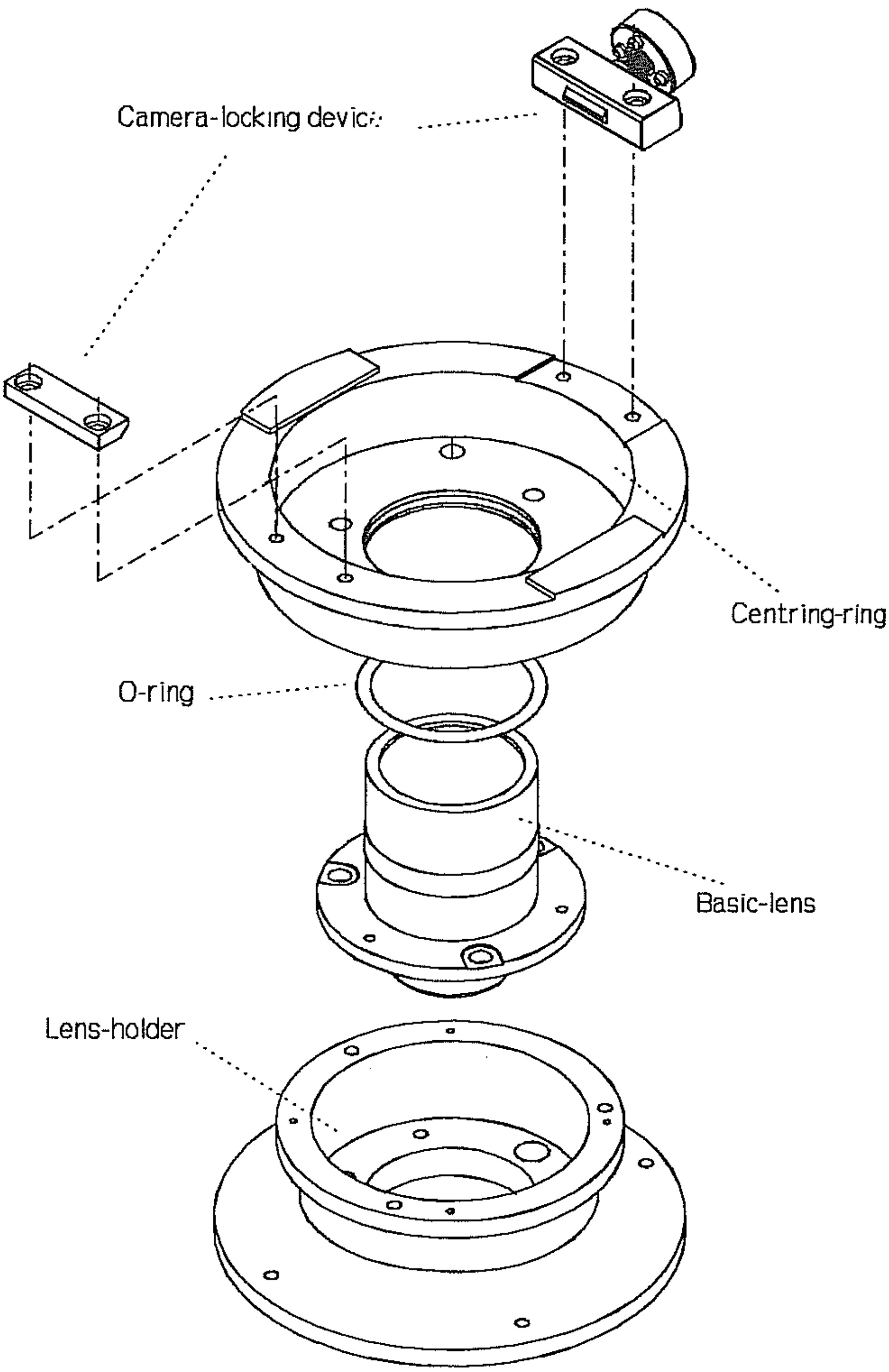
The Basic lens is delivered in a factory assembled and adjusted -II/TV subsystem- and no mechanical adjustments are required in the field.

3. Replacements

3.1. Basic lens

See drawing on page 6.

(1) Take the camera from the basic lens housing.
(2) To protect the II fibre output screen from being damaged: The basic lens to the fibre has to be fully parked inwards the basic lens, by putting a hexagonal screwdriver in the three visible holes [1] and turning the three M4 socket head screws [2] fully to the right (inwards). The basic lens is moving upwards.
(3) Then remove the coupling-ring from the lens holder, 4 normal screws [3].
(4) Now the basic lens is visible. Loosen the three black screws with springs [4] and take out the basic lens.
(5) Remove the three screws with the cap nuts [5] from the defective basic lens and place them on the new base lens. The cap nuts have to be sealed with lock nut e.g. loctite 242. Turn these screws entirely in the ring because otherwise the lens will stick out of the housing and will damage the fibre of the image intensifier output screen when placing the base lens in the housing again.
(6) Place the basic lens in the housing and fix it with the three screws and the three springs [4].
(7) Place the coupling ring on the lens holder. Take notice of the position of the screws with the cap nuts because the holes in the coupling ring must be in line with these screws for the next step. Fix the coupling ring with the four screws [3]
(8) Now, the basic lens must gently be placed against the II fibre output screen, by gently equally turning the three screws [2] (accessible through the three holes [1] in the coupling ring) to the left (outwards) e.g. one turn at the time, in a circular sequence one after another until they are secured.
(9) Mount the camera on the basic lens assembly.


Camera-locking device
Centring-ring
O-ring
Basic-lens
Lens-holder

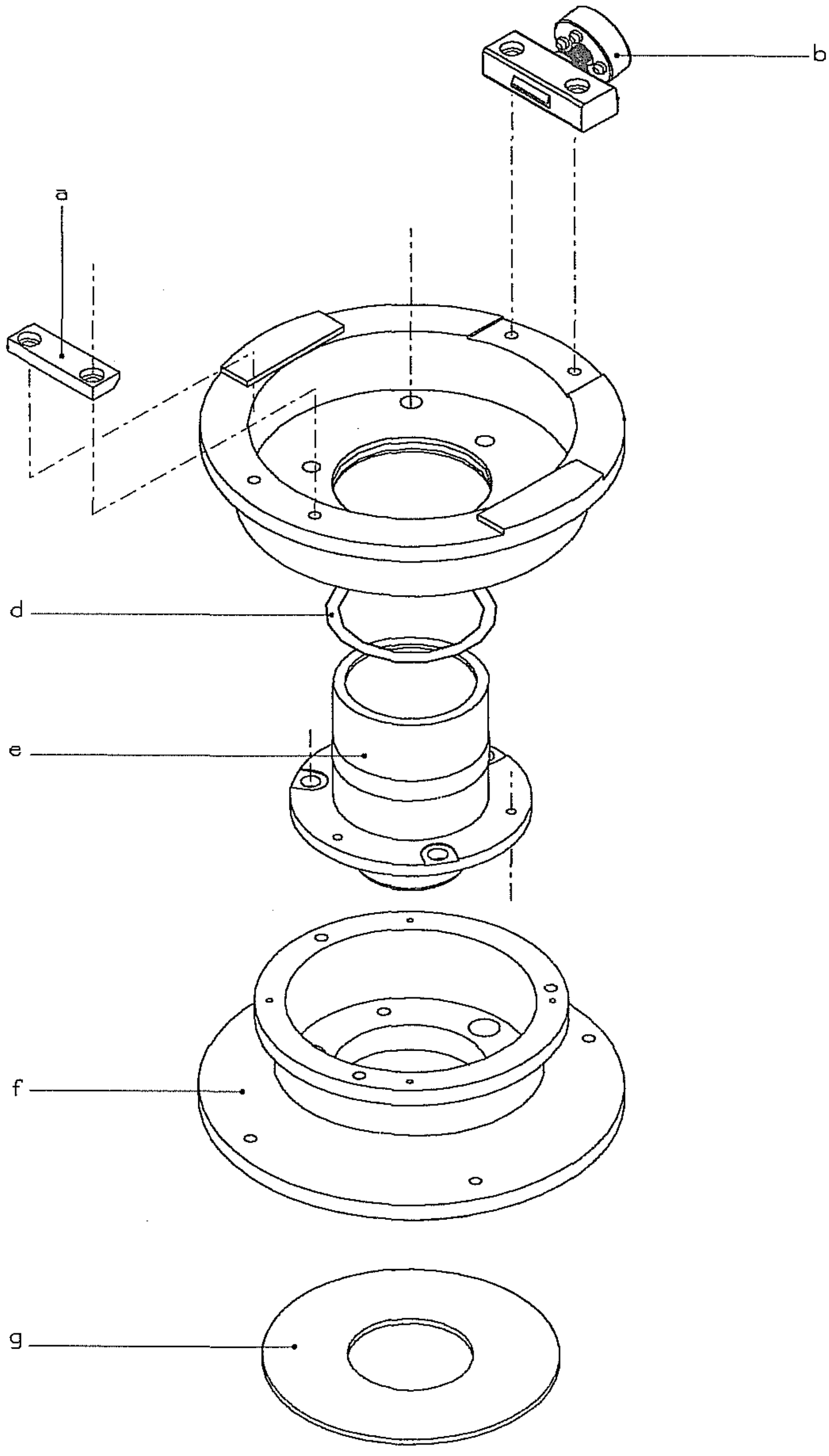
Philips Medical Systems

PARTS LIST — Service

Description	:	BASIC LENS ASSY 15 CM II FOR XTV8S	**Ref. No.**	:	9896 010 02241
Publication No.	:	4522 983 33921	**Product Group**	:	744

LIST OF PAGES AND DRAWINGS

SCHEME/ PAGE 1	INDEX 2	CODENUMBER 3	DESCRIPTION 4	DATA 5
		2622 115 03056	pressure spring	3x
PZ-1	a	4522 161 68783	locking strip	
PZ-1	b	4522 161 84461	locking device assy XTV-8	
PZ-1	c	4522 161 68923	centring ring	
PZ-1	d	2622 080 90758	O ring 49.5 x 3	
PZ-1	e	4522 161 69081	objective helegon 54MM	
PZ-1	f	4522 161 68841	lens holder	
PZ-1	g	4522 161 72141	lead ring	


a
b
d
e
f
g